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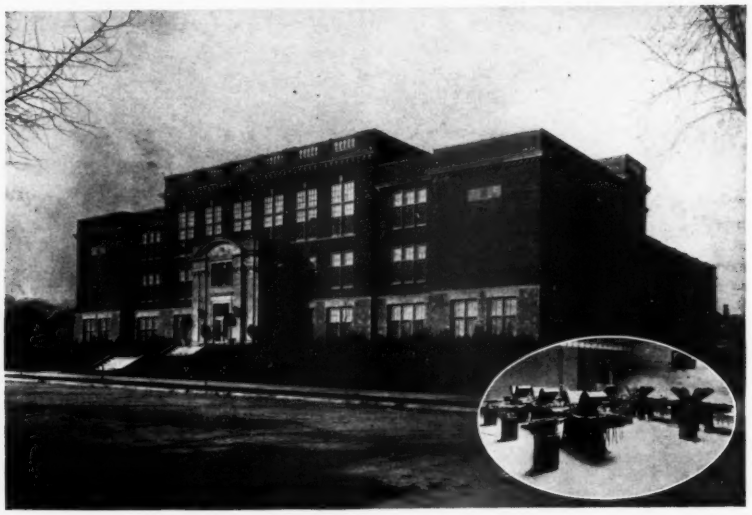

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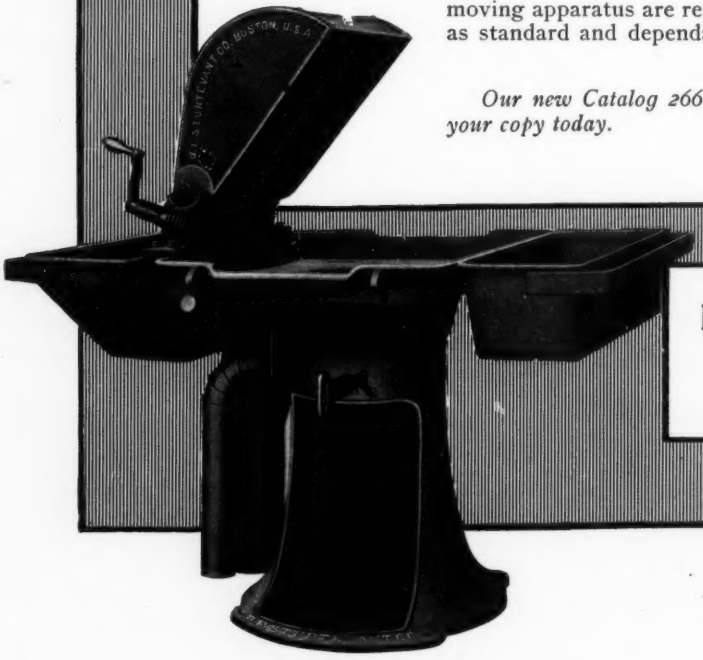

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INDUSTRIAL-ARTS MAGAZINE

Volume XI FEBRUARY, 1922 Number 2

Industrial Arts and Prevocational Education in Our Intermediate and Junior High Schools

Methods of Successfully Offering Courses and Projects

(Article III—Concluded)

A. H. Edgerton, Vocational Counselor, Detroit, Mich.

Cabinet Making Organized on a Useful and Productive Basis.[19]

With the opening of the Jefferson Junior-High School at Rochester, New York, last February, certain shops in the industrial-arts department were used during half of each day for specific trade work, while the other half day was reserved for the general industrial arts work. One of the shops thus dividing its time is the cabinet-making shop. This shop was equipped with individual motor-driven machines of the most modern type, in order to do a high grade of productive work. The industrial-arts courses were organized around certain well analyzed projects, which involved the principal machine and hand woodworking processes and operations in their construction. All work of both classes was done on group projects. The shop was organized and conducted much like a factory, with a superintendent and foreman and the work routed through on a production plan. Each boy received a daily assignment to a job or a machine but no boy individually completed a whole project. That is, the principle of the division of labor was applied but it was not carried to the point of exploitation, as none of the boys were kept upon a particular job longer than was necessary in order for them to become thoroughly proficient in understanding and doing the work involved. There was always the finest kind of interest in the work on the part of the groups.

During the half year about one-fifth of the shop time was spent in oral group instruction on matters of trade theory and science, as well as in discussions of the problems which had arisen in the shop.

The writer believes that this method of organizing and conducting a school shop maintains a better interest, gets more and better work done, and develops a finer spirit than can be done under the individual, complete-project plan, without sacrificing anything in the way of real instruction. In addition, the shop output is immensely increased. During the last half of last year the output of this shop included twelve teachers' desks, 36 drawing tables, thirty pedestals, sixty flag standards, twelve dining-room tables, eight library tables, five 40-drawer cabinets, two hundred drawers for the sewing classes, one flag case, two medicine cabinets, and one speaker's table.

[19]Contributed by Harmon B. Wood, Instructor at Jefferson Junior-High School, Rochester, New York.

Practical Course in Electricity.[20]

The course in Electricity offered in the Duluth junior-high schools was begun in 1917. It is presented in the eighth grade for one semester as a part of the system of rotating various subjects in the seventh and eighth grades for the so-called prevocational groups. The buildings had very little equipment to begin with. Practically all of the wiring for circuits and for the setting up of the instruments and switch boards has been done by the boys in the classes. Some of the equipment has been made by the students. Some has been purchased through the junk-man and the necessary repairs have been made by the boys. The expense of these shops compared to the amount of equipment found in them is relatively very low.

This course has been prepared in units, each unit representing a certain particular branch of the subject. These units have been placed on a chart which shows the correlation between electricity and the other subjects which the students take at the same time. It indicates the teaching units, the shop and laboratory work, the electrical theory, the related science, the drawing and sketching, mathematics, spelling of the terms used in the study, and something of the history of the inventions and discoveries.

There has been no subject offered in the Duluth junior-high schools which has had a more absorbing interest for the boys. Students who have shown exceptional interest and ability in the subject have, on the recommendation of the teacher and consultation with the principal, been allowed to take on an advanced course in this subject in the ninth year. In cases where these boys have been compelled to go to work early, and there have been several such cases, they have secured work in the

[20]Contributed by James A. Starkweather, Assistant Superintendent of Schools, Duluth, Minnesota.

electrical trade at good wages. One particular instance is illustrative of this point. C. R., who was a student in the eighth grade, was rather a bright boy, but, on account of the economic conditions in his home life, he found it necessary to go to work. He was an excellent student in electricity. With some little assistance, he was encouraged to remain through the ninth grade and continue his course while taking the other subjects. At the end of the ninth year he left school and immediately entered the employ of an electrical firm at good wages. He is now occupying a responsible position in one of the leading electrical firms in Duluth, at a salary better than that which his teacher is receiving. He had previously been rolling barrels in a lime kiln after school.

Several other boys who have completed high school have continued their work in science due to the interest aroused in the electricity course. Many of these boys are entering the university in the various fields of engineering. This would not be remarkable were it not for the fact that electricity furnished the interest and enthusiasm for keeping these boys in school during the period of adolescence and tided them over the discouraging time of failures in English and algebra.

Electrical Construction and Repair.[21]

The course in electrical construction at the Garfield junior-high school, Richmond, Indiana, had been carried on previously in lecture form almost entirely. The results were not quite what were wished and, therefore, we began casting about for a plan which would interest the boys more than this course already had done. A very limited equipment prohibited us from allowing the boys to experiment with the usual delicate apparatus about the shop, but yet we believed that the boys of junior-high school age almost demanded construction work which they could do for themselves. To use what we had on hand would have meant that quite soon every piece of apparatus would have been taken apart, with the result that there would then be but a few parts in working order.

A way presented itself soon after school started, when a boy brought a disabled electric train to school and asked to have it fixed. He was told to choose some boy from the class to help him and was then given permission to work on the engine during the class period. Other boys in the class who saw the two experimenting and working together complained of their lot. Some even asked why they must sit and listen to lectures while two of their number were allowed to work on real problems. They were told also to bring in some work which needed repairing and that they, too, might then enjoy those same privileges. On the next day, the shop was transformed from a stiff electrical laboratory, where long lectures drove the boys to hating school, to a practical electrical workshop, where groups of interested boys, with heads together, worked out the repairs for broken toys which had been accumulated over night from cellars and attics about the town. Of course, it is needless to state that we continued to work along that line for the rest of the term. As the repairing of toys played out soon after Christmas, we asked the boys for broken electric irons, vaccuum sweepers, etc. For some time the patrons of the school hesitated before entrusting the boys with their household appliances, but finally we won them over and were kept busy calling for and returning their goods. Unless some new part had to be bought, we charged nothing for our work, and even put a guarantee on it, which was something the local electric shops had not done. We kept account of the work, as the repairs were made, and the cash value of the whole year's work would have been a little over five hundred dollars, provided we had charged the regular prices.

We usually had enough repairing to do to supply every boy with some work. Each class was considered as a separate unit or shift. Each boy who was entrusted with a job was given a helper and held responsible for both job and helper. Over a group of three or four of these workmen was placed a foreman, whose duty it was to help the men out of difficulties and instruct them according to the orders of the general foreman, who was in charge of the whole class. The leaders soon began to show themselves and, after many adjustments, were placed where they could help and learn most. They usually held foremanship positions because of their willingness to help the boys on jobs which gave them trouble. When the classes began, the general foreman would have received his instructions from the teacher and would have told the tool-room man what new problems had been brought to the shop, to whom to give them, where to find any new tools that might be needed, and also would have announced the names of those who were to be the foremen for the day.

The work was quite successful from the standpoint of interest, as each boy had brought something from his home or from the neighbors and had actually repaired some machine or appliance concerning which he had known but little before. It should also be stated that cöoperation with the school wood shop made it possible for the boys to wire the lamps which they had made. One proof of the interest was the landslide of business in electric toys, wireless and telegraph instruments, etc., at the local electrical shops.

SUGGESTIVE TYPES OF INDUSTRIAL-ARTS PROJECTS AND PROBLEMS.

The Doll House as a School Project.[22]

In the Hastings, N. Y., Schools there was need for a doll house in the kindergarten room. This furnished a problem which was taken up as a school project. Its construction required many of the different processes and materials that are necessary in the construction of a home. Nothing is gained if a project presents problems which are too simple or too difficult; or, in other words, if it contains no real problems at all as far as the pupils are concerned. For this reason, in planning this project, the physiological and mental ages of the pupils

[21]Contributed by Walter B Miller. Instructor at Garfield Junior-High School. Richmond. Indiana.

[22]Contributed by Wm. H. Peters, in charge of industrial arts. Hastings. New York.

were considered and the work was divided accordingly. The scheme of work followed was as representative as possible of the actual construction of a house in the field.

It was a "community" project which furnished work of a practical nature and developed an appreciation of coöperation. It gave the pupils an opportunity to use their constructive instincts and capacities in a beneficial manner. It helped them to get the habit of planning to meet their own needs and assisted in making them "handy" about the home and elsewhere, as needs arise. Even though the work was divided among the pupils to meet their capacities, as far as the actual doing of things was concerned, they were always in touch with the other processes going on through observation and discussion. Thus they received instruction in the industries from which man gains his material possessions and studied the industries for the sake of a better perspective on man's achievements in controlling the production, distribution, and consumption of the things which constitute his material wealth.

Method of Procedure. This real desire for a doll house in the kindergarten room suggested the idea of drawing a few rough sketches in the way of explaining what was wanted. From these sketches and a few necessary suggestions, two boys from the mechanical drawing class took the responsibility of the architects, and as a part of their work in the class completed after much designing, plans for the house. These plans consisted of scale drawings of the front, side, and rear elevations for the first and second floors. As in an architect's office, tracings were made from these drawings and finally each boy in the class made several blueprints from them, so several sets of plans were completed. The methods used in an architect's office were taken up and a study of the vocation was made, thus giving the boys an insight into the field of drawing. Specifications were then drawn up by the architects and sets of these were typewritten by the commercial class.

After these plans and specifications were first checked up by the eventual owner, they were given to the industrial-arts department, which had agreed to take the general contract. Two boys from the advanced class

FIGURE V.
Several Group and Individual Projects Were Involved in the Planning, Construction and Furnishing of This Doll House for the Kindergarten.

FIGURES VI AND VII.
The Upper and Lower Illustrations Show an Individual Project in Installing Electric Lights and a Group Project in Painting and Finishing.

assumed the responsibility of general contractors. They were checked up by the architects, who saw that the plans and specifications were being fulfilled. They, therefore, kept in touch with each part of the construction and learned in a practical way the "why" of doing the various things.

There was no real masonry to be done, as it was decided not to be practical in the construction of a doll house; however, the masonry was not neglected, as the boys felt the need for it and suggested many schemes to work it out. This led to a discussion of the many methods of building foundations and chimneys. The proper proportions for mixing the ingredients for a concrete floor were taken up and the boys made use of their previous study of concrete, which had consisted of a study from the rough rock from which the cement is manufactured to the finished product, the different methods of mixing with aggregates in their proper proportions, and the making of such problems as bird houses, flower boxes, etc., which involved reinforced as well as mass construction. In this way and by making miniature urns and flower boxes out of concrete for the doll house, the boys got all of the necessary principles and a "taste" of the work in concrete.

The carpentry in the house offered more chance for actual work. There were many details to be looked after and so a carpenter contractor was appointed. He

in turn picked several boys to act as foremen; a foreman for each group that worked during each of the different periods. The different groups or journeymen were held responsible by the foreman and they in turn were held responsible by the carpenter contractor, who was subject to direction from the general contractors. They were checked up by the architects, whose job it was to see that the owner's plans and specifications were fulfilled. The boys felt the responsibility of their jobs and gave all their efforts to seeing that their part of the job was fulfilled. It was necessary for them to read the blue-prints to carry on their jobs and, as this was a means to an end, the boys became familiar with working drawings.

Plumbing and fixtures for the bath room and kitchen were given over to one of the boys in the sheet metal class. The bath-tub and most of the other fixtures were worked up out of discarded tin cans, which adapted themselves very readily to the shapes desired with very little cutting, shaping, and soldering. The specifications called for electric lights, and an electric bell. Some of the boys who were taking the advanced shopwork were working on electrical problems and, after listening to several lectures given by the teacher of physics, understood fairly well the principles of electricity. But the complete system of wiring a house had not as yet been worked out. This afforded a very good practical problem in physics and so plans and specifications were given over to the physics class. The contract for the painting and interior decorating was taken by the art classes. In Figure VII a group of boys is shown developing the plans for finishing. The work on the curtains, and the like, was likewise taken over by the domestic arts classes.

Furniture for the house was made by the different grades. Different grades furnished different rooms. They seemed to take great interest in this work and the contractor, foreman, and journeymen scheme worked out very well. One grade decided it would like to make the furniture for two of the bed rooms. Before permission was given to start, the members of the classes were asked how they would organize the work so that they would only have the specified furniture when finished. After a few suggestions, they decided that they would carry on a system similar to methods used in the industries. The job was turned over to them. The class president took the floor and a meeting was called to order. There were nominations and a contractor was elected as were also two foremen. The rest were the journeymen, and they were divided in two groups by the foremen. Each foreman and his group took opposite sides of the shop, while the contractor took the responsibility of the whole affair, leaving the instructor with very little to do. Another class took the contract for the making of the furniture in the living room, and worked out their ideas with the help of their class teacher. The manufacturing of the trim for the house was another problem, and it was taken by another grade which worked a factory system scheme. Visits were made to factories and their systems noted.

The actual cost of the material used in the house was taken up as a practical problem in arithmetic. It included the finding of the number of board feet, and the making out of the bill of material. The wood of which it was constructed was studied in the science, geography, and industrial-arts classes by tracing the story of the lumber used from the seed to the finished board. The English class made very good oral reports on the project and also wrote an interesting account of it. In following the above scheme, nearly every department and pupil was represented as having some important part to play in the project.

Projects in Concrete Construction.[22]

When School Number 22 at Buffalo, New York, purchased a universal saw and motor with the proceeds of candy, ice cream, and paper sales, the boys in the ninth grade manual arts class undertook the erection of a suitable base for the new motor. Heretofore their work had been principally in wood and iron, so the construction of the necessary forms was a relatively simple matter. However, sand, gravel, and cement having been provided, the boys donned their overalls and jumpers and began to mix concrete in a workmanlike manner. When the mixture reached the proper consistency, it was poured into forms that the boys had made, fastened by the approved method, inspected, passed, and, in due time, utilized for the installation of the new motor. Since then, the motor has been in constant use and the concrete base is standing up under this test so as to prove that the boys' work compares favorably with that of any contractor.

After this initial success, there was naturally no abatement of enthusiasm when the lads began their next project; especially as its objective was turning a muddy back yard into a real playground. A handball court was the first unit of construction. Mixing the concrete, laying the foundation course, applying a finishing coat, and marking it properly improved the understanding and technique of the youthful builders and provided School Number 22 with a royal battle ground for many a hard fought game of handball.

Next in order of time and of difficulty was the making of a basketball court. The boys laid this job out carefully according to accurate measurements, for which they were held responsible, dug holes, and mixed and poured the concrete, in which they set necessary posts for the baskets. Laying out a baseball diamond, making forms, and pouring concrete for bases followed as a matter of course. This work was performed with as much zeal as are the baseball games it made possible.

Designed originally to apply in the solution of practical problems in industrial arts instruction for ninth grade boys, the work in concrete has been a source of real pleasure, as well as profit. Without exception, every boy has been impressed with the necessity for absolute

[22]Contributed by Carl R. Kraus, Instructor at Public School Number 22, Buffalo, New York.

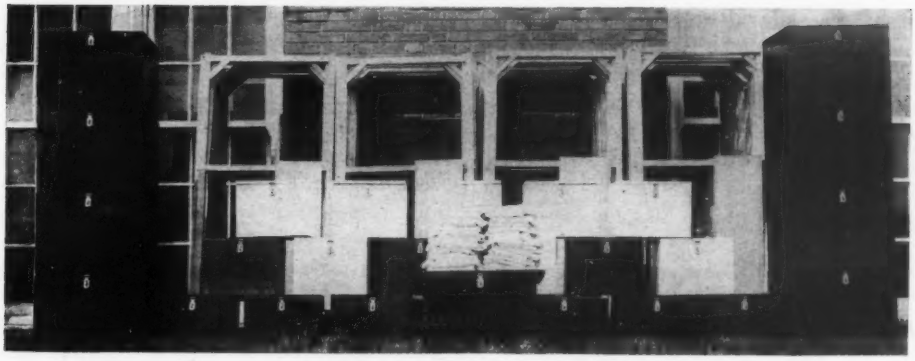


FIGURE VIII.
A $256 Order of Ballot Boxes and Folding Booths Which Was Developed as a Community Project by Pupils at Shelbyville, Indiana.

accuracy, has had awakened within him a love for real labor, has seen opening before him the doorway to a wider knowledge of industry, and has felt the satisfaction that comes from achievement.

Model Building Construction.[24]

On account of the extensive local building at East Orange, New Jersey, we felt that our boys in school should receive a solid foundation in the theory and practice of building construction, and through the close correlation of our drafting department, we were able to secure plans and specifications of simple buildings, such as garages, bungalows, and dwelling houses of the average type.

The automobile garage was featured through this project, and we were able to work into shop foremanship and group arrangement with marked success. The garages were built of wood, with concrete floors and catch basins, framed and finished to comply with the building laws of New Jersey. The scale used was 1½ inches to the foot. In some instances gray cardboard was substituted for wood in shingling, as it well represented slate and was much easier to handle.

Model Garage Construction Projects.[25]

A class of eighteen eighth grade boys at the Burnet Street School, Newark, New Jersey, undertook the building of model garages as their projects for the intensive five-week cycle of shopwork. The models were of frame construction, being made to one-eighth the size of an actual garage. They were 18 inches wide, 30 inches long, and 12 inches from sill to plate, the pitch of the roof being one-third. Six garages were planned and completed.

This class was divided into groups of three, one boy in each group acting as foreman. He was held responsible for the quality of workmanship on his model and the completion of the work within the specified time. The other two boys worked under his direction. These boys showed great interest in the making of the project, and there was much competition between the groups. Talks on timber used in construction; proper sizes of sills, plates, studding and rafters; window framing; garage door building; and the use of the steel square helped to enliven the work.

The art department of the school was consulted as to the color combinations best suited for painting the garages. At this time, the subjects of ingredients necessary for making good paint; the methods of mixing and application of the same were taken up. The boys of the several groups mixed and applied the paint to their particular models, as each one was painted according to a different color scheme.

As the school is located in the heart of a zone where much building construction is carried on, several visits were made to construction jobs in the vicinity. These trips were followed by discussions of working conditions in the building trades, wages, hours of labor, and also the city's building code. The garages, which were sold to members of the class at a price covering the cost of the materials used, were of such a size as to make them desirable for doll, dog, or rabbit houses, as well as studies in frame construction.

Ballot Boxes and Folding Booths as Community Projects.[26]

Teachers of industrial arts are beginning to see that many of the school projects which have been developed in their shops have had little practical application and vital connection with community life. Community projects and problems should constitute a relatively large portion of the school curriculum. It is just as cultural, and far more beneficial, to choose some of the great problems of the community with which to teach students through typical projects how to investigate and find out a solution to some of the things with which they must come in daily contact.

Since women have the right of suffrage, it follows that they should receive careful instruction in the art of voting; but it is also essential that boys and girls of secondary school age should receive this instruction, as the responsibilities and burdens of the government will eventually fall upon their shoulders.

[24]Contributed by Ernest W. Tuttle, Director of Practical Arts at East Orange, New Jersey.

[25]Contributed by Arthur T. Giblin, Instructor in the Burnet Street School, Newark, New Jersey.

[26]Contributed by Roy S. Ray, Instructor at Shelbyville, Indiana.

Ballot boxes and folding booths similar to those shown in Figure VIII are necessities in an election in many communities and are therefore purchased from time to time. No better projects for introducing the study of government could be made in the school shops than these two types of construction. County commissioners at Shelbyville, Indiana, are willing to buy those which are satisfactorily made, and, in many cases, even offer encouragement by placing large orders valued from $100.00 to $256.00. While this is an excellent kind of community project, it is also one of the means of instilling real "Americanism" into public school work.

Making and Operating Radio Instruments.[27]

In planning the work for classes in this all-year alternating school at Newark, New Jersey, it became evident that new problems should be introduced and that some medium other than wood must be used, as the majority of boys entering the upper grades had made all of the models and pieces that could be constructed of wood in the elementary school shops. Radio telegraphy has been introduced very successfully in the eighth grade. The boys in this study of "wireless", as it is popularly known, soon grasp the fundamentals of radio operating. They study the code at home, practicing and reviewing it each period for ten minutes. It is remarkable how quickly they master the key in transmitting messages. During the course they make mechanical drawings of the instruments to be constructed and also draw several plates of radio symbols.

The making of radio instruments brings a new material, metal, to these boys. The boring, filing, grinding, and polishing of the brass parts used in the construction demand absolute accuracy. The wooden parts are all squared and shaped, and then stained mahogany, after which these are varnished and rubbed. The mahogany finish gives a very pleasing result with the polished brass.

Several types of mineral detectors are made by the pupils. The brass strips are bent, soldered, and assembled; the threads are cut and the holes are tapped; while the knobs are cut and shaped from dowels. Two kinds of condensers used in radio telegraphy are assembled. One is of tin-foil and waxed-paper for the receiving sets, and the other of tin-foil and French-glass for the transmitting sets. Each condenser is enclosed in wood. Tuning coils and loose couplers of various sizes are wound on card-board tubing. This requires skill and patience. Some boys assemble their models on base boards, others use panels, and still others make up their sets in units. All instruments are tested and must function before they leave the shop.

During the construction of these models the theory and practice of transmitting and receiving radio messages go on. At the end of the term the boy is capable of operating his own station. By thus varying the models and materials throughout the course, we hold the interest of the boy, avoid the monotony of repetition, and secure results that have a commercial as well as an educational value.

Teaching Cooking to Boys.[28]

An interesting experiment was tried in the Abington Avenue School at Newark, New Jersey, during the past summer. For a portion of the term, girls and boys interchanged their special activities; that is, the boys took cooking while the girls went to the shop. As this is an all-year and alternating-class school, opportunity is given for a greater development of special subjects than is possible in the old type of school, although all subjects are handled on a try-out or prevocational basis.

This is one of the few Newark schools where gardening is continued with war-time fervor, and the garden is one of the reasons for the boys' cooking class. Products of the cultivated lot always have been used for demonstration purposes in the girls' cooking classes, and it was found that this increased their zeal in both departments. Lessons on food values with practical demonstrations in the preparation of vegetables, it was thought, would increase the boys' interest in gardening. No attempt was made to give the detailed course in domestic science, as it is organized for the girls, but the groups of boys on whom the short series of cooking lessons was tried learned some basic facts of food values and some methods that may prove valuable on camp outings.

Home-makers are often required to give first-aid to damaged furniture, and knowledge of how to drive nails straight might be listed with the household arts. The girls, who had exchanged classes with the boys, learned some first principles of wood working. Because the Abington Avenue School is on the alternating or modified Gary plan, both of these courses as given regularly are very extensive. The girls are thoroughly instructed in canning and preserving, as well as in preparing fresh foods.

These selected reports on a number of carefully planned and successfully developed industrial arts courses and projects were prepared by teachers and administrators having somewhat varied points of view and results. As was stated in the preceding article, these contributions were collected by the Industrial-Arts Committee of the National Society for the Study of Education and are published in this usable form by special request. The valuable statements of experience encountered in offering the different activities to meet the needs and interests of early adolescence should prove suggestive to all concerned. It is hoped that both the general and detailed explanations of the actual procedure involved in several of these courses and projects may aid instructors and administrators in determining the relative possibilities in the different plans for realizing common aims or purposes. Numerous requests for such specific information during the past few months have made it evident

[27]Contributed by George F. Bowne, Instructor in the Lafayette School, Newark, New Jersey.

[28]Contributed by Melvin E. Barnes, Instructor in the Abington Avenue School, Newark, New Jersey.

that there is an increasing demand for this type of material when interpreted in terms of the results obtained and the means employed.

Model Motor-Boat Building.[29]

The little water crafts which were made in the Hillside junior-high school at Montclair, New Jersey, ranged in size from 24 inches to 36 inches, and were very popular at the annual Montclair Boat Races that were held last June. Each boat was trued up so that its lines were very much like the large boats, which were approximmately seventy-five feet long. They were all provided with the details and finish or equipment that go to make model-boating a source of real pleasure and recreation.

About one-half of the school year was taken up in completing either type made, but, nevertheless, they were worked out at a commercial profit to the builder. The boys received a great many kinds of shop activity, such as soldering, the use of taps and dies, working in sheet metal, and doing many operations with wood-working tools. A small electric motor is recommended for these motor boats. It should weigh not more than 15 ounces and measure only about three and one-fourth inches high, equipped with a reverse switch. The motor should be well designed, both electrically and mechanically, and wound for battery current only. It is suggested that the motor should be made with field pieces of good wrought metal; that the armatures be constructed of charcoal irons, laminated and well balanced; and that the brushes be made adjustable. When completed, the speed of these boats varies from six to ten miles an hour.

In connection with these boat studies, essays and descriptions were written in the English class; the cost of materials was calculated in the mathematics department; the shipping problems were discussed in the geography class; the art classes made sketches for several posters and also a design for the front of the school paper; while the print shop printed the necessary posters, schedules, and programs for the races.

The annual races held by the public schools are very popular and have been growing more and more each year. Last year nearly 200 boats of all types took part. Gold, silver, and bronze medals were given for workmanship, as well as for speed. Several cups were also given by friends of the school system.

[29]Contributed by John W. Cavlker, Instructor at Junior-High School, Montclair, New Jersey.

Ormolu Rich in Suggestion for the Designer

Specimens on Exhibition in The Metropolitan Museum of Art Show Much That Can Be Studied to Advantage

W. Calver Moore

ORMOLU is the name given to a class of bronze ornaments, usually gilded, and for the most part applied to furniture, that was originated by one of the famous brothers Boule, who flourished at the end of the seventeenth century. Perhaps it was to Andre Charles Boule, cabinetmaker and a favorite of Louis XIV, who granted him apartments in the Louvre, that we are indebted for the art. This noted woodworker became famous for his marquetry, the name given to light and complicated figures of brass or unburnished gold and other metals, set as ornaments into surfaces of ebony, walnut, other dark woods, or tortoise shell. This is also called *boule* or *buhl* work and most of us have seen reference to "buhl" cabinets as noted pieces of antique furniture, although there is no good authority for the revised spelling.

Be that as it may, ormolu received the royal seal of approval. The art was developed for princes, and attained so great favor with the upper classes that, before its decadence at the inception of the Empire period, furniture was actually being designed to harmonize with the motif of the ormolu that was to be applied to it.

As a consequence of the high standing which ormolu enjoyed, the most eminent designers were engaged in its creation, and it is doubtful if the best examples of the late Louis XV and early Louis XVI period, which are on exhibition in the Metropolitan Museum, have ever been surpassed in quality and chasing by workmanship of any kind.

PLATE A. BUST OF LOUIS XV.

Through the courtesy of that institution, which is taking a constructive interest in the extension of art in industry, we are able to reproduce for the benefit of the student some of the most noteworthy examples of ormolu

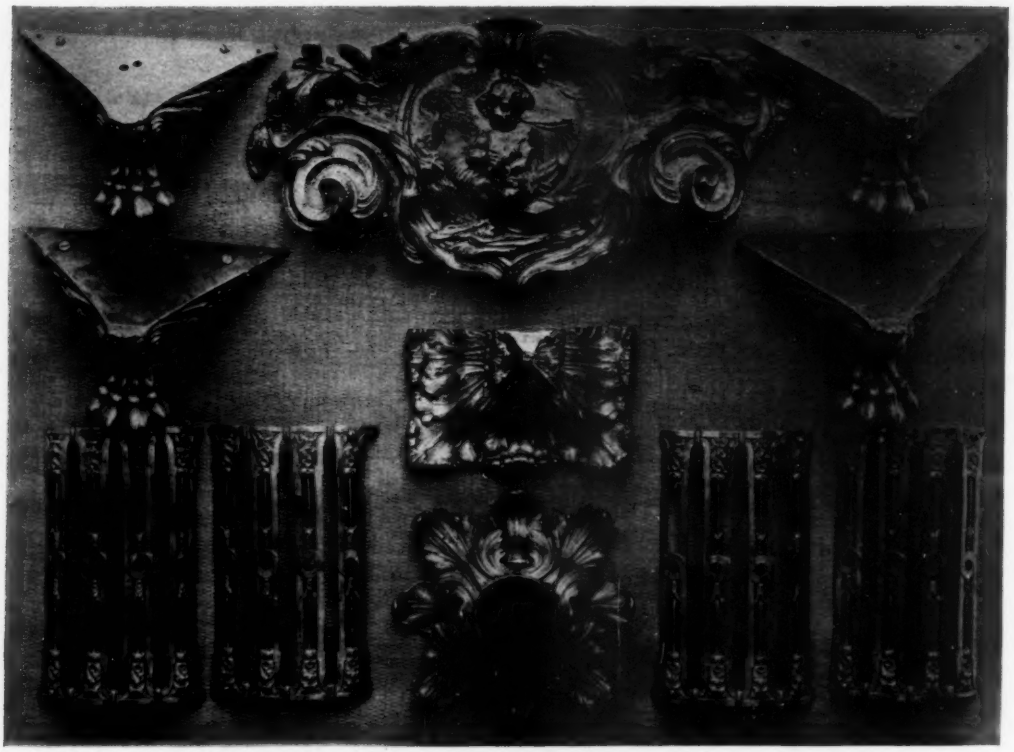


PLATE B. FURNITURE ORNAMENTS.

during its most flourishing period.

These illustrations will repay careful study, inasmuch as there is more or less interdependence among the various arts of design and each must demand from the other the best that it can offer. Breadth of view is the best basis for the conception of new ideas in design, no matter whether it be in the field of furniture or stove castings. We must go outside of ourselves for inspiration.

Ormolu can be studied to advantage both because of the quality of design and the chasing, two cardinal principles in all the ornamental arts. The best French examples, which were produced during the latter half of the eighteenth century, are particularly noteworthy in the latter respect, exhibiting unusual comprehension of the possibilities of the medium as well as a wonderful degree of skill in the craftsmanship.

Too often, in the decorative art of today, we see designs that are meaningless, merely a collection of lines and curves, angles and contortions, that appear to reflect nothing definite in either conception or execution. We are not passing through a "period" in the sense that much of what is being done today is so lacking in definition and character that future generations must look back at these times as being merely an interim between the Colonial and what is yet to come.

This condition in the arts of design may be due to any of a number of causes, and analysis of the situation cannot be attempted in this article. Nevertheless, it is generally admitted, and while it would seem that if no immediate remedy can be prescribed, it will at least be wise for the student of decorative art to search out the best that has been done in the past as a foundation for his own development along lines that are consistently and harmoniously artistic.

The bust of Louis XV, illustrated in Plate A, is worthy of study, not only because of the fine quality of the design, but also because of the skill with which it has been carried out in the molding process and the nice care and feeling shown throughout. It was this quality of feeling that has given its elegance to French art in all branches. It would be difficult to find a sculptured bust that reflected more personality or faithfulness in reproduction.

The middle ornament in the upper part of Plate B would be noteworthy no matter in what medium it were produced. The grace of design, the harmonious flow of line and splendid balance of its composition are exceptional. The four claw feet, originally the supports of a buffet or chest, and the other pieces shown on this plate are also splendid examples of ormolu.

Characteristic specimens of the larger kinds of furniture ornaments are shown in Plate C. Notice the delicacy and expressiveness of the eagle, the similarity of the two designs on the sides, which might appear identical at first glance, and the rich ornamentation of the drawer pull at the bottom.

In the center of Plate D, which is a group of ornaments showing great variety of line in characteristic design, may be seen the lock of a pair of cabinet doors.

This design could be adopted for door plates or for the lock of a large double door in a building. Two oval figures, with wreath and leaf like ornamentation that appear on this plate would require but little alteration for French silver or polychrome mirror frames in the style so popular now, or for photograph frames. The group at the top, probably representing the Goddess Diana on a hunting expedition, the medallions at either end and other pieces shown on this plate are all suggestive.

A number of small ornaments including several styles of boss and ferrules for the legs of chairs and small tables are shown in Plate E, and even in these small and relatively unimportant objects we can detect the expression of a high degree of art.

It is not very difficult to find examples of ormolu on old clocks, mirrors and picture frames, as well as on antique furniture in the curio stores and museums. However, it deserves more recognition because of its artistic worth than has been accorded it in recent years, and will prove a veritable fountain of ideas to the student or designer who will collect it and observe it.

While it is unlikely that ormolu may enjoy a renaisance in connection with furniture, judging by the present day tendency of furniture design, it should provide, nevertheless, good inspiration for worthy creations in other fields. There is a constant demand for new patterns in electrical fixtures, such as wall brackets of the sconce type, chandeliers, lamps and candle sticks. Desk ornaments and book ends, ornamented iron work, concrete and terra cotta, pottery, jewelry, and some kinds of domestic hardware such as door handles and hinges, drawer pulls, window lifts and many other articles of commonplace nature might be made more pleasing to the eye through adaptation of the designs evolved by the artists who created ormolu and made it popular.

Some of the ormolu in the Museum collection from which these photographs are made is the work of such eminent French designers as Gouthiare and Thomire, and certainly no modern follower of art need hesitate to emulate the work of these old time masters.

John Foster Frasier, an eminent English traveler and authority on art, has written an expression of his opinion regarding art development in America in which he states: "America is slowly evolving and developing the type of art that is not Jacobean, nor Georgian, nor Moorish, nor Byzantine, nor Renaissance, nor Iranian, nor Allah-knows-what, but, just American. I have seen and stayed in their wonderful houses which are an expression of the American temperament. I discerned in my easy dilettante rambles about the United States a splendid striving after the beautiful. The hand is not always steady, but, the vision is sure. I believe that in the heyday of American art not only will there be as firm a national type as ever Greece produced, but owing to the increase of culture, houses will be not mere living places, but will be distinctive of the peoples who have built them. Those who proclaim that the canons of art

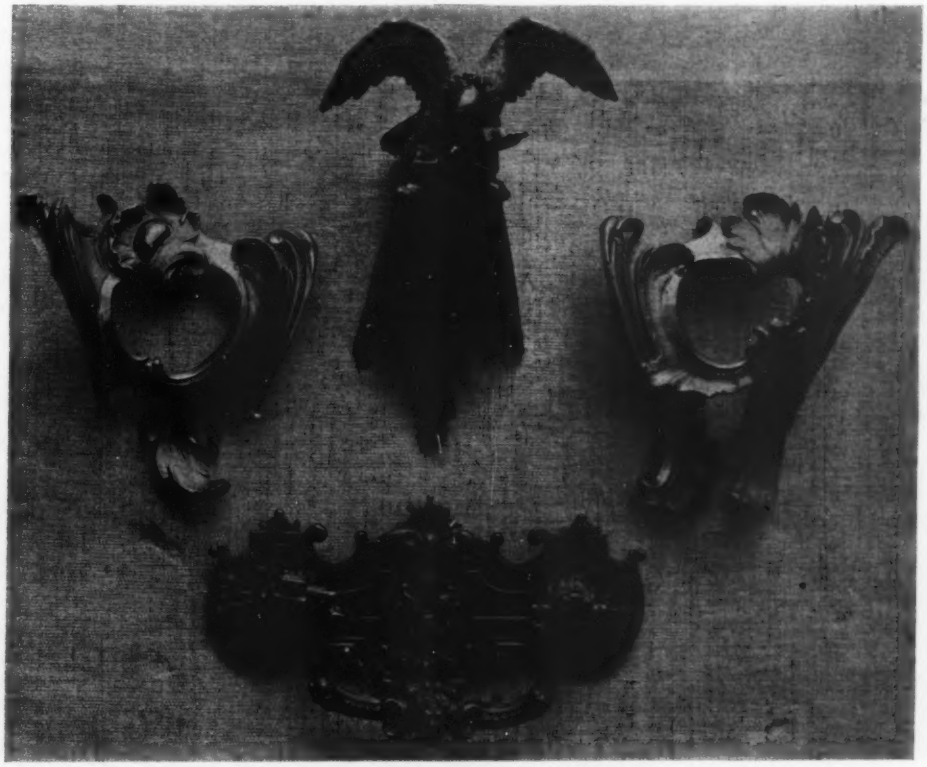


PLATE C. LARGE FURNITURE ORNAMENTS.

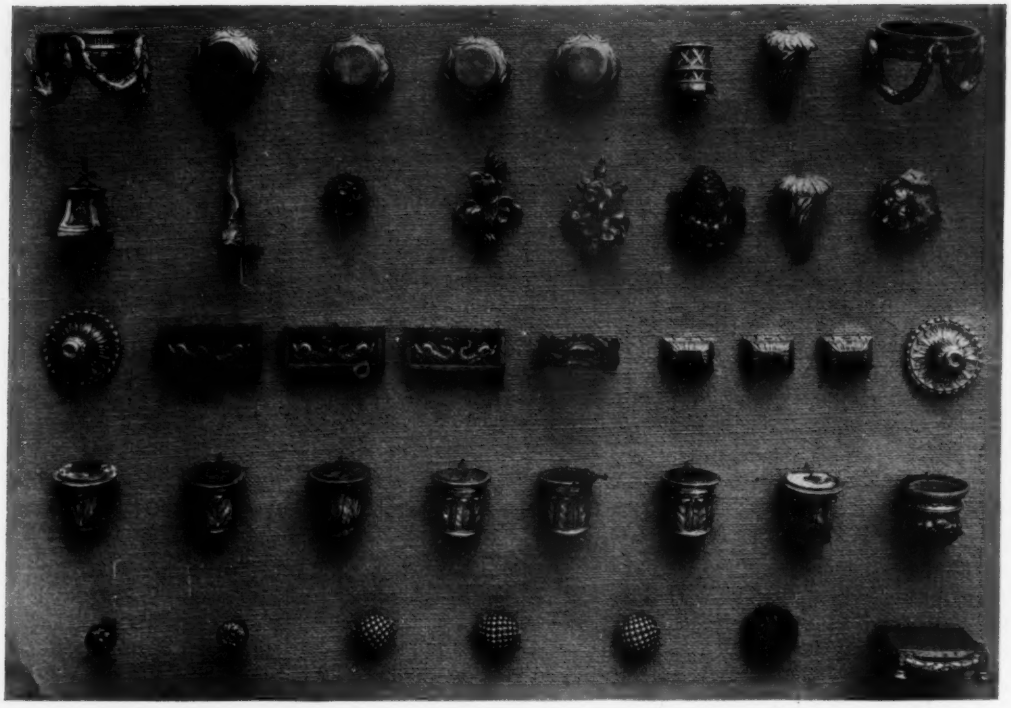


PLATE D.

have been defined for all time betray a lack of imagination. There is only one canon of art and that is beauty."

Regardless of the delicate compliment offered to our national culture development by this Britisher, who may have been partly inspired by a wish to refer gracefully to his hosts who entertained him during his American tour, and regardless also of the fact that his comments were applied more to architectural design than to some other forms, his position is untenable if he rests on the statement that art of a recognizable excellence and purity of type can evolve from a mere effort to express the beautiful.

The designer of today, in most branches of art and particularly in the field of industrial design, needs more than vision and inspiration. This can be seen easily by anyone who will trouble himself to analyze the motif of some costly production and consider its chance to endure on the basis of artistic worth, rather than mere excellence of technical finish.

To reduce this statement to terms of greater perspicuity for the student, let him go to a dealer in high

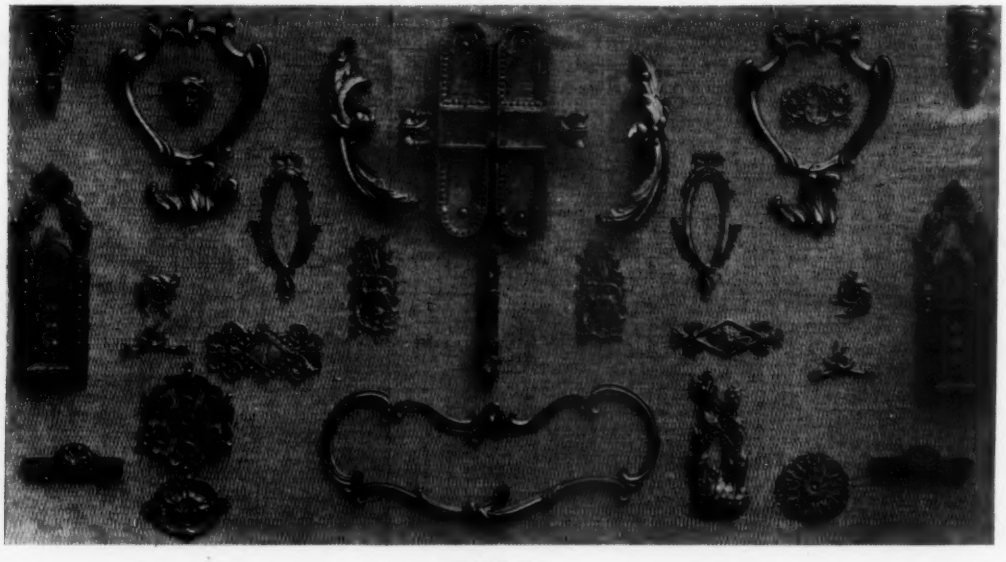


PLATE D.

class objects, such as furniture of the most expensive grade or costly electric lighting fixtures and, selecting something which is recommended as "the very newest and best", analyze it. He may find all the periods of art, or none of them, represented in a single piece. The object which appeared beautiful at a casual glance becomes offensive to cultured taste on more careful observation.

For these reasons, such complimentary statements as that of Mr. Frasier are misleading, if not actually harmful. To succeed we must be our own severest critics.

Let the student, before he indulges in flights of originality, be sure that he is at least able to produce something that has a worthy classical foundation. It is on this basis that a study of ormolu in its best period will yield true guidance and safe inspiration.

Fidelity to the recognized principles of art should ever be the accompaniment of the effort to increase technical skill, not only for the future of the designer himself, but, because it is due to his patron and to posterity.

How Blotting Paper Is Made

Jane Littell

BLOTTING paper is made of rags, soft cotton rags that break up easily into small fibres. Sometimes to this is added a grade of cotton that is a by-product from the mills which extract oil from the cotton seed, for when the cotton seeds arrive at the mill, they have been cut off from the fluff of cotton of which they were the center, and bits of cotton cling to the seeds. This is rubbed free, packed into bales, and sold to the manufacturers of blotting paper.

Rags come to the paper mills from all over the world. The warmer the country, the more cotton goods are used, and consequently the larger available supply of rags. Romantic Egypt, the beautiful island of Capri, Morocco, Turkey, Holland, France, Belgium and Germany are great rag producers. Following is an illustration of the way in which a rag merchant in Cairo would dispose of his accumulation.

First he sends samples of the rags—it seems queer that there should be qualities of rags, but so it is—to a rag broker in New York, who in turn sends the samples to the paper mills together with quotations. The broker solicits orders in hundred-ton lots, and he offers each particular packing to the mill where he thinks it will be satisfactory. If his offer is accepted, the first shipment is scheduled to arrive in thirty days. This is repeated until the Cairo rag merchant's accumulation is disposed of.

The rags are disinfected at the port of export, if there is cholera or any other epidemic in that country. After their arrival in New York, they are sent on to the mill which contracted for them, and sometimes complete a journey of some five or six thousand miles before they are converted into paper.

Grading Rags.

At the paper mill, the bale is weighed, opened, and the rags thrown into a whipper or duster, a box containing rolls set with long iron teeth or prongs which pick the rags up as they are thrown into the box and shake out any foreign matter such as stones, bones, sand, and sometimes horned toads, lizards and other desert residents. These rags are then delivered to the women who are called sorters. The sorters cut off the buttons, buckles, hooks and eyes, open the seams and sort the rags according to grade.

The soft white rags that were once sheets, pillow cases, under garments and the like, are called first grade rags. These go into one pile. Colored cotton goods such as ginghams, aprons, and dresses are another grade. Old overalls, colored ducks, are still another grade. After the rags are sorted, they are delivered by the women to an overlooker, who goes over them again carefully, as it is very important that these rags be free from buttons, buckles, and foreign substances.

The rags are then delivered to the cutting room, where they are fed into a pair of tandem cutters with revolving knives, which cut the rags to a size of about two inches square. These small pieces are then taken up by an endless belt and carried to a dusting box, which is a cylinder made of wire netting with an agitator moving in the opposite direction in which the cylinder is revolving. This collects all the loose fibres and lint which passes through a screen into a bin below.

The rags going on through are picked up by another belt and carried to the rotary boiler. The lint collected in the dusting box is baled and shipped to a roofing mill, who in turn make it into roofing paper. The gentleman who led me through his blotting paper mill the other day explained that he was trying to emulate the meat packer, who gets everything but the squeal.

After the rags reach the rotary boiler, which usually has a capacity of five tons, a quantity of caustic soda and a pressure of live steam are introduced into the rotary boiler for cooking purposes. This is necessary in order that the grease and other foreign matter may be made soluble, and washed out in cold water. The rags are cooked about twelve hours, and come out of the rotary a very brownish shade, and to the uninitiated it would seem that there would never be a chance of making them white.

Washing and Bleaching Rags.

Next the rags are delivered to the washers, which are large iron tubs, in which they revolve and pass directly under a set of knives. These knives, unlike the ones used to cut the rags after sorting, have very little cutting edge, drawing out the fibres of the rags instead of shearing them off. Clean water flows in at one end of the washer and is expelled at the other end by means

of a wire covered drum so arranged inside as to form buckets. A certain quantity of bleach is then run into the washer, which in turn is washed out, then a quantity of sulphuric acid. The stock is now white and ready for the drainers.

From the washing process the pulp is pumped into drainers, large concrete vaults paved with porous brick, and allowed to stay until, to use the paper mill term, it is seasoned. The pulp is allowed to stand in the drainers until the water is drained off through the porous floor and all trace of chlorine and sulphuric acid is eliminated by evaporation for should any remain, the absorbent quality of the blotting paper would be affected. This requires in some cases three weeks, and in the case of the grade of rags from which the best blotting paper is made, four or five weeks.

Now starts the art of making blotting paper. A certain quantity of rags, a certain quantity of soda pulp, a certain quantity of filler, and then some color. These are all beaten together with water in a machine called a beating engine, until the fibres have been thoroughly colored and reduced to the correct lengths, after which the mass is pumped over to the "stuff chest", a storage receptacle connected with the actual paper making machine.

The formula for each grade is different, of course. The cheaper the grade of blotting paper, the more filler is necessary in order that the cost of production be accordingly kept down. One of these, a mineral called talc, is mined in Eastern New York State, and is nothing more or less than the talcum powder sold in richly lithographed boxes at quite an enormous price. This is a fibrous mineral used exclusively as a filler. Soda pulp, another one of the substitutes for rags, is a pulp made from poplar or chestnut wood, which has been ground up and made into pulp by a soda process. This is very absorbent, but has not the strength of the rag stock.

Ready for Paper Making.

After this stock reaches the stuff chest, it is then ready for the forming of paper. The stock, which by now looks like milk if white blotting paper is to be made, flows over a screen made of brass plates with openings one thirty-second of an inch wide. This catches any wadded or balled up material. The stock then goes over an apron onto a closely woven endless wire where the sheet is formed.

Before the invention of the machine which is at present in use, fine papers were all made by hand, and in order to knit the fibres together the operator had to shake the stock back and forth to accomplish this. The same process is carried out by the huge machine now in use. The wet end of the machine has a motion from side to side and in this way the fibres are very closely interlaced before they reach what is known as the Couch roll, where the sheet gets the first squeeze. From these rolls it goes onto the press rolls, which all go to make the formation of the sheet. Then the paper passes onto the driers, which are cylinders heated with steam.

The blotting paper is now an endless sheet, a measured distance wide, and in order to be cut to the size required goes onto a sheet cutter from the driers. It is then cut into sheets and tied in packages to be delivered to customers in San Francisco, Boston, Buenos Aires, Rio de Janiero, Auckland, New Zealand, and in fact every place where blotting paper is known and used. Thus the people in some far off land may have their cast-off clothing returned to them in the form of blotting paper, and never know the romance of travel connected with the desk necessity they use.

Valentines

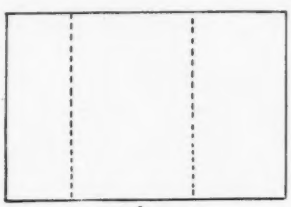
Miss S. E. E. Hammond, Assistant Supervisor, of Art, Springfield, Mass.

1—Valentine Folder.

Material:

1 pc. white paper 6″x9″.
1 pc. red paper 1″x2″.
1 picture.

Fold white paper, 6″x9″, on short diameters so that one 6″ edge laps over other 6″ edge. Illus. 1. Fold red paper, 1″x2″, on short diameter. Keep folded, fold again. Paper is now ½″x1″. Cut hearts. Illus. 1a.



-1-

-1A-

Paste hearts on narrower folded oblong of white paper, Illus. 1, placing folds of hearts to 6″ edge of paper. See picture of folder. Paste picture inside. Picture may be a figure or head cut from a magazine, fashion plate, or crepe paper, or cut outs such as can be found in stores at Valentine time.

2—Bird House.

Material:

1 pc. white paper 3¾″x9″.
1 pc. white paper 2¼″x6″.
1 pc. green paper 3½″x7½″.
2 pcs. red paper little more than ½″x1¼″.

Fold white paper 2¼″x6″ on long diameter. Cut house. Illus. 2. Paste on green paper, 3½″x7½″, See picture. Fold red paper, ½″x1¼″, on short diameter. Keep folded, fold again. Cut hearts. Illus. 2a. Paste hearts in house back of doors. Mount green paper on white paper. Place under weight.

No. 2.

-2-

-2A-

3—Ball of Hearts.

Material:

3 pcs. white paper 3½″x4″.
6 pcs. red paper 2½″x2½″.
1 pc. red or white cord 20″ long.

Fold white papers 3½″x4″ on short diameters. Cut heart from one folded white paper. Illus. 3. Using this as a pattern, cut hearts from other two folded white papers. In this manner fold red papers, 2½″x2½″, and cut six red hearts. Paste one red heart on one white heart. Repeat with one more red heart and white heart. Place pasted hearts together with red hearts on outside. Slip third white heart between other two. See that the edges are even. Push a large needle through the hearts at the points A and B. Illus. 3a. Place the ends of cord together. Thread loop end of cord down through A, up through B, down through A. Slip long ends of double cord through loop, adjust cord to hold hearts securely, tie ends. Paste four red hearts between leaves of white hearts. See that leaves radiate evenly from center.

4—Love Heart.

Material:

1 pc. white paper ½ of 6″x9″ or 4½″x6″.
1 pc. red paper 2½″x5″.
1 pc. white paper 1½″x5″.

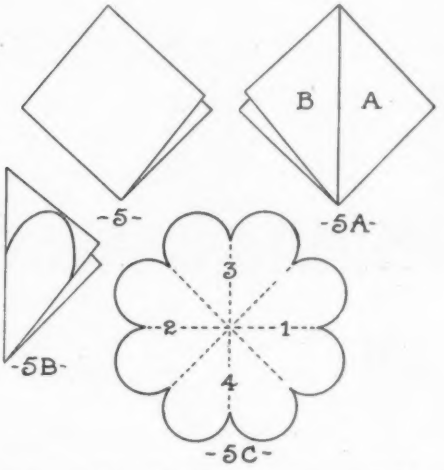
Fold white paper, 4½″x6″, on short diameter. Keep folded, fold on short diameter. The paper is now 2¼″x3″. Cut connected hearts. Illus. 4. In like manner fold red paper, 2½″x5″, and cut connected hearts. Paste red hearts on white hearts. Place under weight. Fold white paper, 1½″x5″, on short diameter. Keep folded; fold one 1½″ edge back to fold. Repeat with other 1½″ edge on opposite side. Paper is now divided into four parts. Illus. 4a. Print the word LOVE in red letters. Illus. 4a. Refold strip. Apply paste to two outside surfaces, place between white hearts. Rub well.

5—Folding Rosette of Hearts.

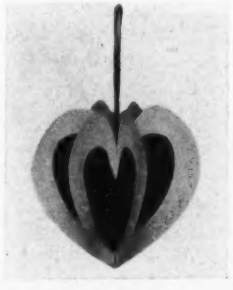
Material:

1 pc. white paper 4½″x6″.
1 pc. red paper 4½″x4½″.
1 pc. red paper ½″x6½″.
1 pc. red paper a little less than ½″, about ⅜″x6½″.

On white paper, 4½″x6″, draw light line one inch from and parallel to one six inch edge. Repeat on opposite six inch edge. Fold paper on short diameter, lines on outside. Fold red paper, ½″x6½″, on short diameter. Apply paste to strip, paste on white folder,



placing lower edge of strip on lower pencil line. Repeat for narrow strip, ⅜″x6½″, at top. Cut off extra lengths of strips. Fold red paper, 4½″x4½″, on diameter. Keep folded, fold on short diameter. With four open corners at top and fold to the left, fold right corner to left corner. Illus. 5 and 5a. Fold part marked A



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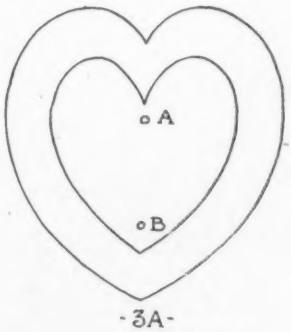

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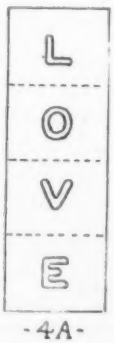

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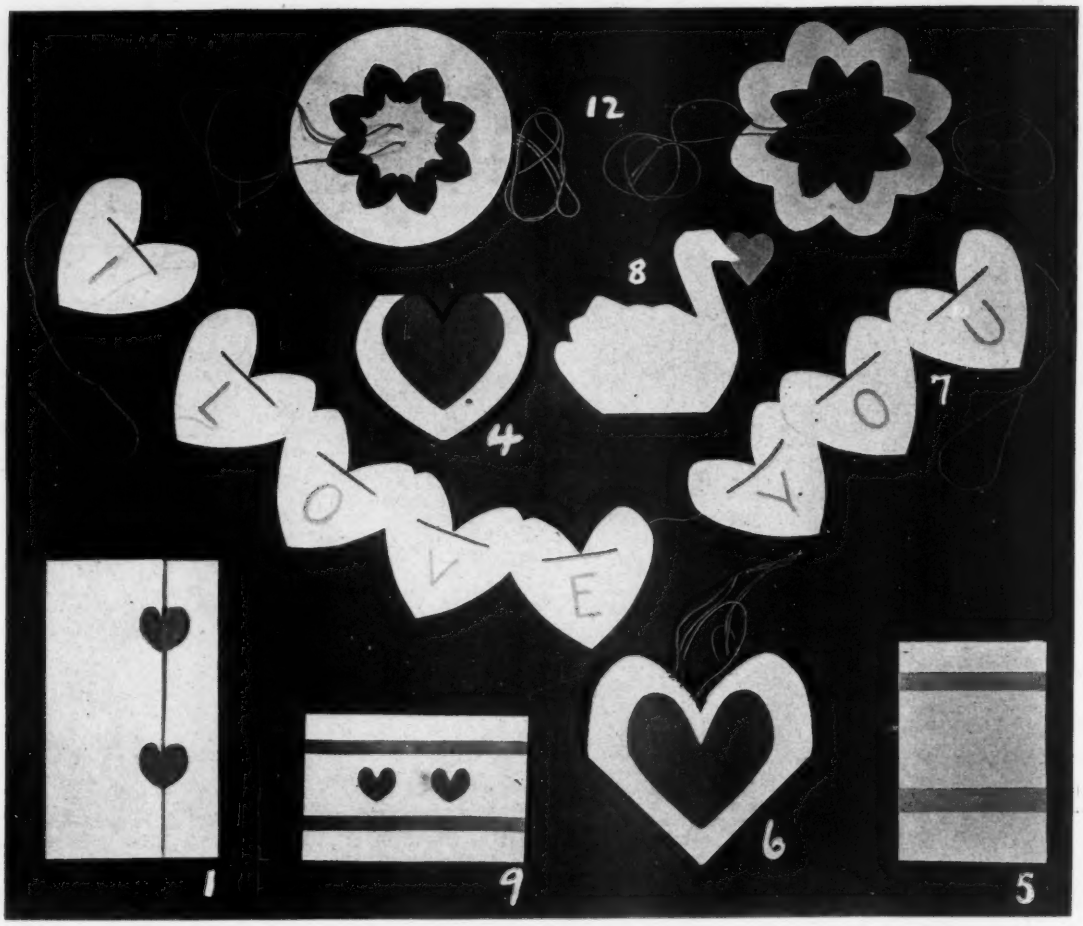


VALENTINES TO BE MADE IN SCHOOL.

on opposite side to part marked B. Cut as shown in Illus. 5-b. You now have a rosette of hearts. Illus. 5-c. Bring folds of opposite hearts 1 and 2 together, keeping hearts 3 and 4 flat. The paper now is in the shape of a heart. Apply paste to both sides, place inside folded white paper with point of heart to middle of fold. Close paper, press firmly. Rosette now will open as folder is opened.

6—Heart Basket.

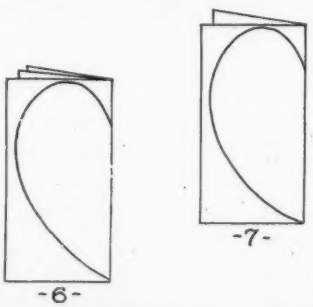
Material:
1 pc. white paper 9″ square.
1 pc. red paper 3″x6″, or two 3″ squares.
2 pcs. red cord 15″.

Fold and cut white paper nine inch square to form rosette. See Folding Heart Rosette. Fold red paper, 3″x6″, on short diameter. Keep folded, fold once more. Paper is now 1½″x3″. Cut hearts. Illus. 6. Paste hearts on outside hearts of basket. Thread cord in needle. Lap two inside folded hearts. Punch two holes about ¼″ apart through two lapped hearts with needle. Draw cord through two holes, tie ends. Repeat with second cord drawing in from opposite side.

7—Chain of Hearts.

Material:
8 pcs. white paper 2½″x2½″.
1 pc. red cord 36″.

Fold eight pieces white paper 2½″x2½″ on one diameter. Cut heart from one folded piece. Illus. 7. Using this as pattern cut seven other hearts. With red crayon print one letter on each heart to make the message I LOVE YOU. The folds in the hearts will aid in

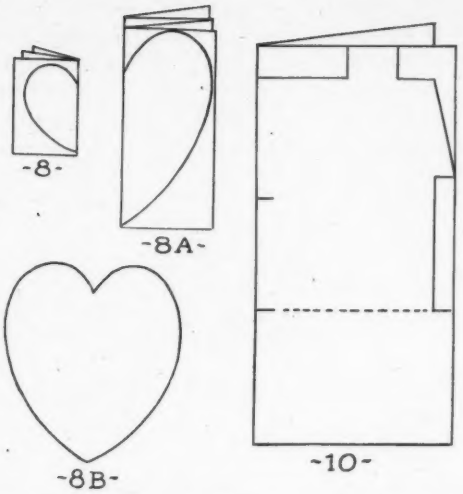


placing the letters. Thread cord in needle, string hearts in order of message. Care should be taken to space well both words and letters.

8—Swan Valentine.

Material:
1 pc. white paper 4″x7½″.
1 pc. red paper 1″x1¼″.

Fold white paper, 4″x7½″, on short diameter. Cut swan having top of head at fold of paper. Fold red



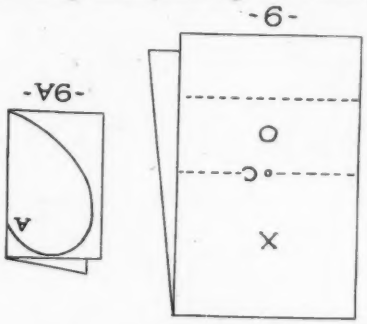
paper, 1″x1¼″, on long diameter. Cut heart. Paste heart to bill of swan.

9—Four Folding Hearts.

Material:

1 pc. white paper 3″x9″.
1 pc. red paper 2″x9″.
1 pc. red paper ¾″x2″.
2 pcs. red paper ¼″x4½″.

Fold white paper, 3″x9″, on short diameter. Fold red paper, ¾″x2″, on short diameter. Keep folded, fold again. Cut single hearts. Illus. 8. Paste on white folder one red strip, ¼″x4½″, one-half inch from and parallel to top edge. Paste second strip a little more than one-half inch from and parallel to lower edge. Paste two small hearts between red strips. See picture. Place under weight. Fold red paper, 2″x9″, on short diameter. Keep folded, fold again on short diameter.



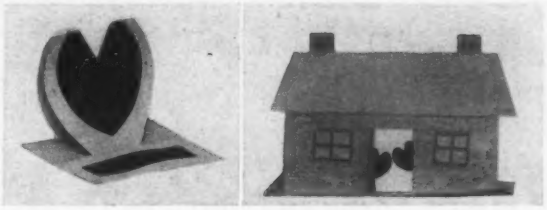
Fold two inch edges back to two inch fold. Repeat for two inch fold opposite two inch edges. Illus. 8-a Paper is now 1⅛″x2″. Cut connected hearts. Illus. 8-a. Open hearts. Illus. 8-b. Fold back one end of heart. This reverses fold. Apply paste to two outside hearts. Place between leaves of white folder. Rub well, put under weight to dry.

10—Valentine on Place Cards.

Material:

1 pc. red paper 3″x9″.
1 pc. light weight paper 2¼″x3″ (pattern).
1 pc. white paper 2″x4″.
1 pc. white paper ½″x2″.

Fold red paper, 3″x9″, on short diameter. Keep folded, fold again. Fold inside three inch edge back to



No. 10 AND No. 11.

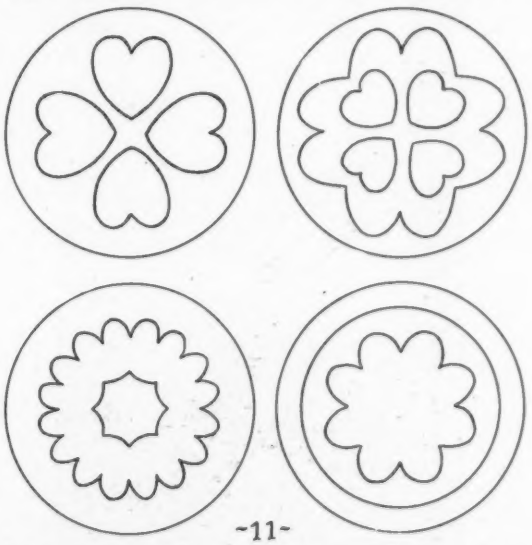
fold. Open paper leaving only first fold. Paper is now 3″x4½″. Illus. 9. Mark middle point c. Fold light weight paper, 2¼″x3″, on short diameter. Cut heart. Illus. 9-a. Place heart on surface marked X placing end of middle fold of heart to point c. Illus. 9. Trace, cut on traced lines and ends of fold. Fold white paper 2″x4″ on short diameter. Keep folded, fold at right angle to first fold. Paper is now 1″x2″. Place folded pattern on paper 1″x2″. Trace line marked A. Illus 9-a. Remove pattern, cut on line, finish cutting heart shape leaving tie of paper at top of heart. Paste on double red heart. Paste white paper ½″x2″ on oblong 1⅛″x3″ marked O. Illus. 9. Place three inch edge of oblong 2¼″x3″ between oblongs 1⅛″x3″ with with three inch edge to three inch fold. Paste both ends of each 1⅛″x3″ oblong.

11—A Standing House of Hearts.

Material:

1 pc. white paper 4½″x9″.
1 pc. red paper ¾″x1¼″.

On white paper 4½″x9″ draw light line 1½″ from and parallel to 4½″ edge. Repeat on opposite 4½″ edge. Fold paper on short diameter. Keep folded, fold at right angle to first fold. Cut as shown in Illus. 10.



Unfold, cut one vertical side of door. Draw windows with black crayon. Color side of house green, door black, chimneys red. Fold white oblong 1½″x4½″ back on house. Fold opposite oblong to opposite side. Cut two hearts from red paper ¾″x1¼″, paste hearts in house back of door. Place a little paste inside house at ends near windows.

12—Wheel of Hearts.

Material:

1 pc. tag board or light weight cardboard, 4½″ circle.
1 pc. light weight paper 4½″x4½″.
2 pcs. red paper 3½″x3½″.
1 pc. red cord 36″.

From light weight paper 4½″x4½″ cut rosette of hearts. For directions see "Folding Rosette of Hearts." Using this as a pattern trace rosette on 4½″ circle of tag board. Cut on line. From red paper 3½″x3½″ cut rosette of hearts. Repeat with second piece of red paper 3½″x3½″. Paste one red rosette on side of tag board rosette. Paste second red rosette on opposite side of the tag board rosette. Thread red cord in needle. Mark center of rosette. Place two dots at opposite sides of center of rosette and about ¼″ apart. Punch holes at these points with needle. Draw cord thru holes, tie ends of cord. Slip rosette to middle of cord. Now rosette is ready to spin. Put one or two fingers in loop ends of cord. Hold cord almost straight, whirl wheel toward you a few times. Tighten string by holding hands farther apart as wheel turns. When wheel almost stops relax string a little and it will twist again. The tag board may be left in circle and other heart designs in colored paper used. Illus. 11.

Making Concrete Surfaces More Attractive

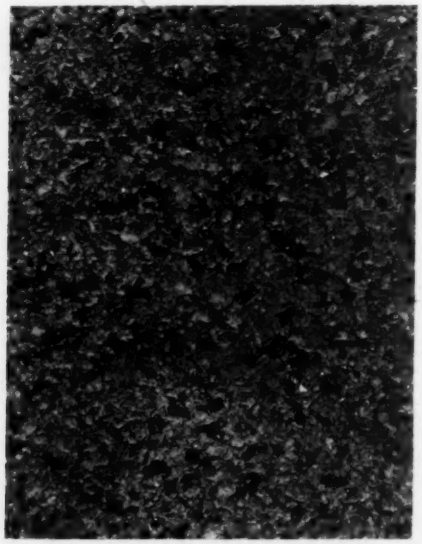
R. E. Watkins, Chicago

INSTRUCTORS of manual training who teach concrete work, find that the ordinary gray color of concrete surfaces is not always suitable for the articles which they assign to their class. It is possible to secure more desirable effects by the judicious use of coloring material and special aggregate. This not only produces more desirable articles of concrete but gives the student a keener interest in the work.

Mineral Colorings.

Only the best mineral colors should be used for coloring concrete. Experience has shown that when they are used properly colors may be secured that are attractive and durable.

The raw materials that may be satisfactorily used are red iron oxide to produce pinks and reds, brown iron oxide for browns, iron hydroxide for the yellows and buffs, manganese dioxide, lamp black and carbon black for the various shades of gray and slate approaching black. From these raw materials, manufacturers of mineral colorings make different combinations, producing a wide range of colors. Manufacturers furnish with their product directions for its use.



SECTION OF CONCRETE SURFACE ENRICHED BY USE OF GRANITE AND MARBLE.

Ultramarine blue is sometimes recommended for producing a blue and chromium oxide for obtaining a green shade. Blue and green are not as satisfactory as the other colors and have a tendency to fade.

The quantity of mineral coloring to use should never exceed ten per cent by weight of the portland cement in a mixture. Following table is submitted as a basis for obtaining the different colors. Experience will show quantities of coloring necessary to produce desired variations in the colors.

Color	Percentage of Coloring to Cement by Weight	
Pink	1%	Red iron oxide.
Light brick red	4%	Red iron oxide.
Red	6%	Red iron oxide.
Light Buff	4%	Iron hydroxide.
Yellow	10%	Iron hydroxide.
Light Brown	4%	Brown iron oxide.
Brown	10%	Brown iron ox.de.
Gray	½%	Carbon black.
Blue slate-light	½%	Lamp black or Manganese Dioxide.
Blue slate-dark	4%	Lamp black or Manganese Dioxide.
White	May be obtained by using white cement with white sand or other white aggregate.	

Careful weighing and mixing of the coloring with the concrete materials is important. All materials should be carefully measured and thoroughly mixed together before water is added.

Coloring by Immersing.

Small articles of concrete may be colored by immersing in a color bath. Sulphates of iron and copper are best suited for this purpose. The solution will be absorbed by the concrete, the depth of penetration depending upon the porosity and dryness of the concrete, upon the strength of the solution and upon the time of immersion. One pound iron sulphate to two gallons of water will produce a red brown color. Two pounds to one gallon of water will give a light cream color after immersing a few seconds.

One pound of copper sulphate to three gallons of water will give a green color to an article made of gray

cement and common aggregate when immersed for 24 hours. Practice will give experience necessary to obtain good colors by this method.

Use of Special Facing Aggregate.

The most satisfactory method of obtaining attractive concrete surfaces is by use of colored aggregates. Such aggregates are granite, marble, mica and various colored sands. These aggregates should be used in practically the same way as ordinary sand, one part of cement to two or three parts of the aggregate will be satisfactory for most purposes.

In order to bring out the desired color effects from the aggregates special surface treatments are necessary:

Brushing: Surfaces may be brushed with a stiff fiber or fine metal brush from six to 24 hours after object has been removed from forms. This removes the surface cement and exposes the aggregate. Care should be exercised in brushing the corners that they will not be broken.

Spraying: The film of surface cement may be removed by spraying with water, before the concrete has hardened appreciably. The operator should stand far enough from the article so that only a fine mist hits it. Spraying should be stopped as soon as a glistening of the aggregate appears.

Scrubbing: After the concrete has hardened to some extent, it may be scrubbed with water. A stiff fiber brush should be used. The results very similar to that obtained by brushing will be secured.

CEMENT JAR FACED WITH MICA AGGREGATE.

Acid Washing: The film of surface cement may be removed from the hardened concrete by dipping or washing in a solution of muriatic acid and water in proportion of 1:4. The acid should be thoroughly washed from the concrete when the desired effect has been obtained.

Tooling: After the concrete has thoroughly hardened it may be tooled, bush hammered or otherwise treated in the same manner as natural stone.

Instructors will find that the use of special aggregates and coloring matter will greatly improve many articles of concrete. The suggestions outlined seasoned with a little experience should enable anyone to attain a considerable degree of success in the work.

A CORNER OF THE EXHIBIT OF STUDENTS' WORK AT HARDIN JUNIOR COLLEGE FOR WOMEN, MEXICO, MO.
Miss Mary Shackleford, Head of the Art Department.

The Organization and Teaching of Industrial Subjects in a Part-Time or Continuation School

Robert H. Rodgers, Specialist in Industrial Education and Teacher Training,
New York State Educational Department

(Continued from January)

IV. **General Organization of the Industrial Subjects for the Accomplishment of the Vocational Guidance Objective.**

The objectives have been set up and the next step is the organization of the program of work to bring about the desired results. The present organization of manual training or the industrial arts will not secure these results in the terms of the vocational guidance objective. An opportunity was afforded in New York to verify this statement. Approximately 75 of the smaller cities made use of the existing high school departments and attempted through the regular teacher of that department to give the usual content of the courses in those subjects. It resulted in the part-time pupils receiving a small amount of practical work in general woodwork. It may have functioned in the field of general education, but it contributed very meagerly toward any vocational guidance. Nondescript woodwork has no place in the part-time school.

It has been stated earlier in this discussion that vocational guidance may be most effectively given by means of practical experiences in the various occupations. The manual training or industrial-arts shop equipped for general woodwork was not successful in accomplishing the purpose. To secure the results that are expected of the part-time schools, the industrial activities should be organized around groups of trades. The following grouping is suggestive of the classification of the major skilled trades. Many other groupings in the fields of textiles, clay and pottery, glass, and foods are possible.

Building Trades
- Carpentry.
- Cabinet work and interior finishing.
- House wiring.
- Painting and decorating.
- Plumbing.
- Bricklaying and masonry.

Metal Trades
- Machine shop.
- Sheet metal work.
- Welding.
- Toolmaking.
- Forging and drop hammer work.

Electrical Trades
- Motor operation and repair.
- Power plant operations.
- Telephone work.
- Electrical street railway.
- Lighting work.
- Wireless work.

Automobile Trades
- Motor work.
- Chassis and transmission work.
- Starting and lighting.
- Tire work.

Printing Trades
- Composition.
- Presswork.
- Photo-engraving.
- Electrotyping.
- Book binding.

Drafting Trades
- Machine.
- Architectural.
- Structural.
- Topographical.

Every course that is organized must give consideration to three factors: (1) the practical jobs; (2) the related technical work; (3) the related auxiliary information.

The practical jobs should in all cases be selected from the standpoint of contributing an accurate experience of the work in the trade or occupation. Failure to secure this type of experience defeats one of the major purposes of the instruction.

The related technical work which includes the science, drawing and mathematics should develop from the practical work being carried on in the shops.

The related auxiliary information should also develop from the shop activities and be a definite part of a unified course. It should consist of safety and hygiene, trade terms, materials and equipment, and the vocational guidance facts. The last phase of the related auxiliary information is the one that has been least understood and appreciated. The following outline of topics is therefore presented for the vocational guidance material.

Function of the Occupation.

Relation of the specific occupation to the other trades in the trade group.

Importance of the Occupation.

Numerical place the occupation fills, locally and nationally.

Value of product turned out locally and nationally.

Comparisons with other occupations—use graphs.

Conditions of Employment.

Mental and physical strains involved in the daily routine of work.

Specialization and its effect on the worker.

Dangers involved that must be taken account of: tools, machines, appliances, riggings, scaffolding, etc.

Legislation pertaining to safeguards.

Hygiene of the Occupation.

Ventilation and its relation to the health of the worker.

Fumes, dusts, acids, poisons and their effect on the health of the worker.

Economic Conditions.

Hours and wages of the occupation.

Average number of working days and income per year.

Average period of earning ability.

Comparison with other occupations.

Profit sharing, insurance and pension provisions.

Legislation pertaining to hours and wages.

Evolution of labor and industry.

Entrance to the Occupation.

Age at which the occupation is usually entered.

Various ways of entering.

Apprenticeship and conditions the learner encounters.

Legislation pertaining to apprenticeship.

Demand for Labor.

Relation between supply and demand.

Factors influencing the labor market.

Ratio between the number of workers in the specified occupation and other related trades.

Mental and Physical Requisites for Efficiency in the Occupation.

Character of education, training and experience needed for success.

Personality, attitudes and aptitudes requisite for success.

Importance of good health, hearing, eye sight, and mental and physical alertness.

Opportunities for Advancement.

Lines of promotion within the trade or industry and the rewards and responsibilities accompanying them.

Trade and technical requirements for advancement.

Personality, attitudes and aptitudes contributing to promotion.

V. **Plant and Equipment for Teaching the Industrial Subjects in a Part-time School.**

The Composite One Room Shop for the Small Community.

The needs of the working boy, 14 and 15 years of age, may be served best in the small community by offering industrial activities other than the formal High school bench woodwork. This should give way to shop activities in the building trades and possibly the metal trades. Local industrial conditions will in all cases determine the final selection of the trade groups for instructional purposes. In a community where the metal industries predominate the metal trades would naturally be given—the idea being to train workers for the prevailing local needs.

To illustrate the one room composite organization more in detail, it will be assumed that a small community desires to develop the program around the building trades group and the metal trades group. It will be possible to offer practical work and instruction in the following trades providing equipment is available.

Building Trades Group.

Practical work offered in

Carpentry.

Inside finishing and cabinetmaking.

Inside wiring.

Painting and decorating.

Metal Trades Group.

Practical work offered in

Machine shop

Sheetmetal work.

The above organization indicates that practical activities cannot be carried on within the school for all the trades of each group. Chart Number II which follows is to show that the related technical and auxiliary information may be made an integral part of the instruction for the trade group.

Chart II. General Organization of Instruction for the One Room Composite Shop.

Trade Group	Practical Jobs	Related mathematics, science, drawing, safety, hygiene, trade terms, equipment and materials	Vocational Guidance
Building Trades	Carpentry Inside finishing Inside wiring Painting and decorating	Carpentry Inside finishing Inside wiring Painting and decorating Plumbing Masonry	Carpentry Inside finishing Inside wiring Painting and decorating Plumbing Masonry Building contractor Architect
Metal Trades	Machine shop Sheetmetal	Machine shop Sheetmetal Toolmaking Forging Welding	Machine shop Sheetmetal Toolmaking Forging Welding Machine drafting and designing

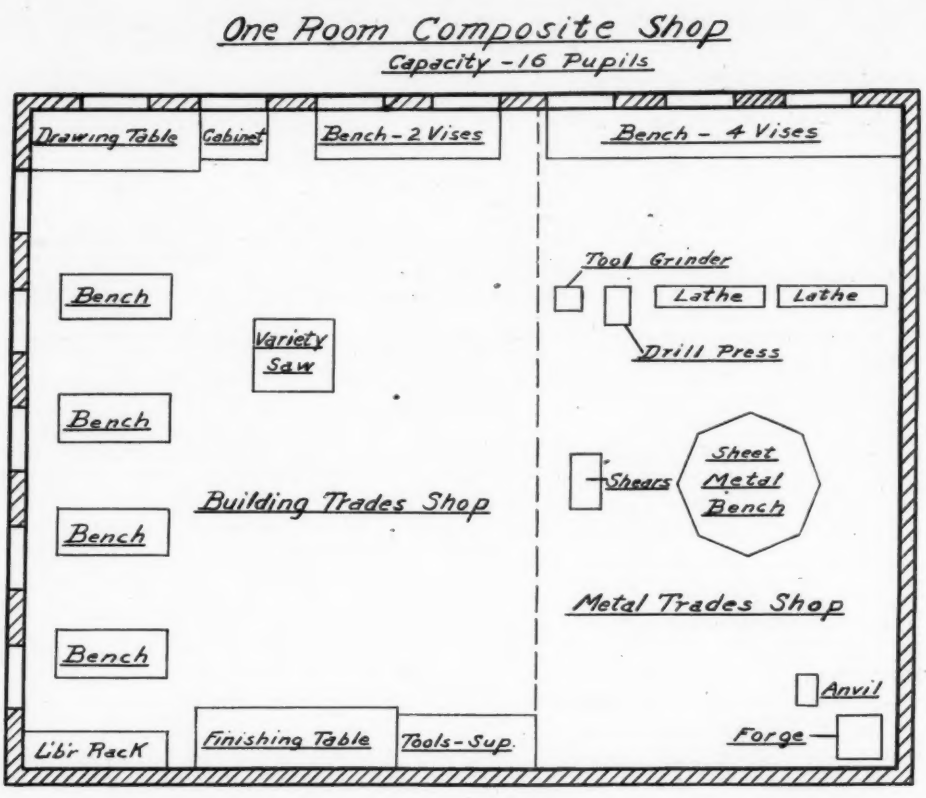
Chart II indicates that practical shopwork in some form is carried on in six trades. Instruction of a technical nature is drawn from eleven different occupations while vocational guidance information is presented from fourteen distinct occupations. If the trade groups are thoroughly representative of the occupational activities of the community this instruction should be most beneficial.

This program is possible only in a shop especially planned for a variety of activities. The shop layout which accompanies this article is suggestive of the type of shop necessary to offer instruction on a trade group basis. In the main, the layout is self-explanatory. The entire thought back of this plan was to provide space and equipment, that would at least approximate in a small way, actual conditions in a good production plant. Critics have said that composite shops are not found in the industrial world which is quite true, but it must be recognized that the composite organization is an effort to set up in miniature a small section of a production plant, each one in itself accurate as far as possible in regard to equipment, materials, constructions and conditions of the occupations.

A study of the shop layout reveals that it has lost its formal classroom appearance. Benches and equipment are placed as they are found outside of the school. Space is also available for the construction and assembly of work which is so essential when the products are other than taborets, plant stands and piano benches.

Equipment for the Composite One Room Shop.

The equipment for this type of shop is not extensive. In fact, most manual training or industrial arts shops are provided with much of it. In practically all cases, a complete re-arrangement will be necessary. The



PLAN FOR COMPOSITE ONE-ROOM SHOP IN CONTINUATION SCHOOL.

lists here presented should be considered as comprising the minimum of equipment.

Building Trades.

Carpentry, Inside Finishing, Cabinetwork, and Painting.

1 Variety saw, motor, belting and guard.
x 4 Single benches with vises.
x 1 Long double bench with vises.
x 1 Long drawing table.
x 1 Cabinet for drawings.
x 1 Cabinet for tools and supplies.
x 1 Lumber rack.
8 Folding chairs.
x16 Individual drawing boards.
Individual tools for 6 benches.
General tools.
Portable blackboard.
Glue pot.
Clamps.
Paint and varnish brushes.
Scrapers.
Supplies: lumber, screws, nails, glue, sandpaper, paints, oils, stains, varnishes, colors, turpentine, etc.

x May be made in the shop.

Inside Wiring.

Small tools: hammers, screw drivers, pliers, hack saws, braces and bits, files, knives, etc.
General equipment and supplies: testing instruments, knobs, cleats, switches, bells, lamp sockets, globes, push buttons, batteries, bell wire, light wire, annunciators, tubing, conduit material, screws, nails, staples, etc.

Metal Trades.

Machine Shop Work.

2 12″ Engine lathes, motor, belting and shafting.
1 Single spindle upright drill.
1 Tool grinder.
1 Gas furnace or forge.
1 Anvil.
x 1 Long bench.
4 Machinist's vises.
Hand tools.
1 Set forge tools.

Sheet Metal Work.

1 Squaring shears.
1 Burring machine.
1 Wiring machine.
1 Beading machine.
1 Bow folder.
1 Pair forming rolls.
x 1 Heavy bench.
4 Double burner gas furnace.
Small tools and equipment: hammers, punches, snips, dividers, squares, soldering coppers, pliers, stakes, mandrels, plates, etc.
Supplies: tin plate, galvanized iron, copper zinc, common black iron, wire, rivets, solder.

NOTE—All machines should be equipped with approved guards.

x May be made in the shop.

It is estimated that the shop may be equipped for the dual purpose at approximately the following cost:

Building Trades Shop.....$1,200.00
(Making equipment specified)
Metal Trades Shop..... 2,500.00

Total Cost $3,700.00

The Teacher in the Composite One Room Shop.

This type of shop is essentially a one teacher shop. It will require a man of more than average ability and one with a wide general experience in industrial work. The industrial-teacher-training departments in the state normal schools are making efforts to provide this type of teacher. This particular course is two years in length with at least two full summers of approved practical work in industry.

Chart III. Unit Shop Organization for Larger Schools. Two or More Shop School.

Building Trade Group (Unit Shop)	Metal Trade Group (Unit Shop)	Printing Trade Group (Unit Shop)
1. **Trade activities in**	1. **Trade activities in**	1. **Trade activities in**
Carpentry	Machine shop	Composition
Cabinetmaking	Sheetmetal	Presswork
Inside wiring	x Toolmaking	x Bookbinding
Painting	x Forging	x Linotyping
x Plumbing	x Welding	x Monotyping
x Plastering		x Photo-engraving
2. **Technical work**	2. **Technical work**	2. **Technical work**
Related drafting	Related drafting	Related art work
Related mathematics	Related mathematics	Related mathematics
Related science	Related science	Related science
3. **Auxiliary Information**	3. **Auxiliary Information**	3. **Auxiliary Information**
Safety and hygiene	Safety and hygiene	Safety and hygiene
Trade terms	Trade terms	Trade terms
Equipment—materials	Equipment—materials	Equipment—materials
Vocational guidance facts	Vocational guidance facts	Vocational guidance facts

x Practical work not given in these trades, only the vocational guidance facts and some of the technical and auxiliary information.

A small number of skilled tradesmen are also being secured who measure up to the requirements. Teachers in service are attending Summer Schools in increasing numbers and are also being prepared to meet this new requirement of the part-time education program.

Industrial Work in a Two or More Shop School.

The same objectives prevail in the larger school, as in the one shop school. The difference is that added facilities are available for each trade group and usually each shop has a separate teacher. This is essentially a much more desirable organization of the industrial activities. Local industrial conditions should again determine the types or combinations of trade work to be developed.

Time Allotted to Practical Work.

In schools equipped for two trade group activities, the students should be encouraged to spend enough time in each to make an intelligent occupational decision. As previously indicated this may vary considerably with individuals. Schools prepared to offer more than two lines of work should permit the students to elect the trade groups they desire to pursue during the prevocational period. The carrying out of this suggestion may present practical difficulties in the matter of distributing students through the different trade activities. This may be largely obviated by each student electing at least two groups.

Organizing the Industrial Subjects in a Two or More Shop School.

Each trade group has an independently equipped shop and a teacher. Chart No. III indicates the organization that is recommended for a larger school.

Suggestions for a Shop Layout.

A safe principle to follow in laying out a shop for a part-time school is to avoid the arrangement that presents the appearance of the formal classroom with its rows of benches, desks or tables. Endeavor to approach the well laid out modern commercial shop. Note that the layout of the one shop school presents a radical departure from the old manual training shop.

The minimum amount of floor space for sixteen students should be 1200 square feet.

Equipment for a Two or More Shop School.

The equipment for each trade group shop will be more extensive than that provided for the one room composite shop. Additional machine tools, benches, and individual equipment should be installed.

It is estimated that the building trades shop could be equipped for $3,000. The metal trades shop would require approximately $4,500 and the printing trades will need about $1,800. In all cases these are minimum estimates.

The Teacher in the Two or More Shop School.

A unit shop organized about a single trade group will not require so large a degree of versatility on the part of the teacher as does the one room composite shop. It will be easier to secure an instructor who is able to teach a group of trades in his own immediate field than one proficient in two distinct fields. In both cases bet ter than average work will be needed on the part of the teacher.

Teacher training courses with the requirements for resident and practical work are rapidly moving forward to meet this new demand. Improvement and extension courses for teachers already in service are also in a measure aiding in the broader preparation of the teachers demanded in the many new part-time schools.

(To be Continued)

DESIGNS BY HAZEL G. COLLINS.

"Home Made Machinery"

(Third Article)

Charles W. Frost, Granite County High School, Philipsburg, Montana

COMBINATION DISK AND SPINDLE SANDER.

A combination sander is one of the most useful machines for either cabinet or pattern maker, and can be made to save time and labor in a multitude of ways in the manual training shop.

It is also the least complicated of machines, consisting merely of an upright framework supporting a single horizontal shaft in babbitt bearings. This shaft is fitted with step pulleys for varying its speed; babbitt collars; and with one end threaded and fitted with a nut to hold sand disks, spindles of various sizes, and such other abrasive and buffer wheels as the nature of the work to be done requires.

The disk sander has, to a large extent, supplanted the miter plane and chute board, and also the trimmer, in modern cabinet and pattern shops. The disk part of this combination machine is used in the manual training shop to round the ends of such pieces as book racks, shelf support cleats, and small clock cases. It is used to trim joints by the use of the tilting table and angle fence, (one or both), to any required angle or combination of angles. Cutting compound angles at one operation is quite a convenient method of saving time to pattern makers, and for such problems as the joints in mission lamp shades in the cabinet or manual training shop.

With disks covered with carborundum cloth instead of the garnet paper the disk sander becomes a good machine for grinding and polishing metal work or tools.

Table and chair legs of the various period designs; curved chair back rails; gun stocks, and countless other similar pieces can be worked down to shape from band sawn blanks by the use of spindles the required diameter covered with coarse garnet paper. The same spindles with fine sandpaper are used for finishing the surfaces; and covered with fine, worn sandpaper, or polishing cloth can be used to rub down varnish or polish with furniture wax.

Buffer wheels for polishing art metal work; carborundum grinders, and saw gummers can be used with the necessary bushings to hold them in place on the shaft.

The combination disk and spindle sander illustrated is driven direct from the manual training shop's main drive shaft, the hanger at one end of which is fastened to the floor under the sander table. Shaft, pulley and belts are thus covered, adding materially to the safety of the department. The machine can, however, be driven

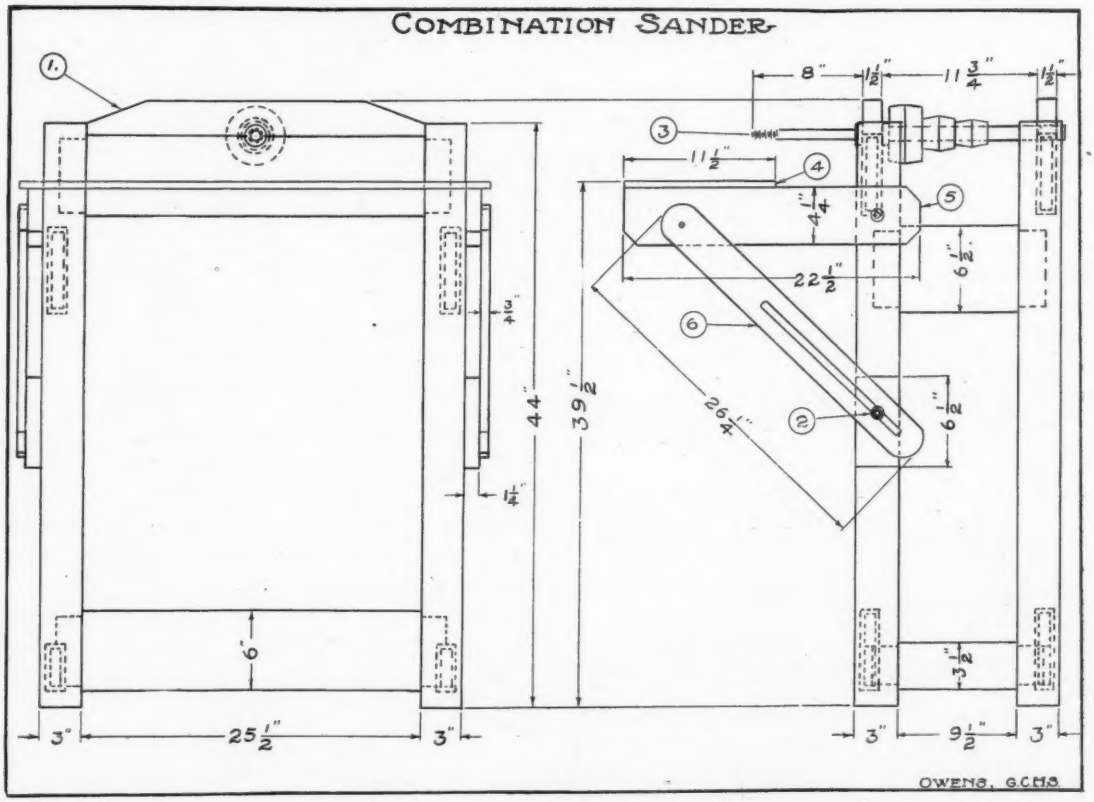


PLATE I.

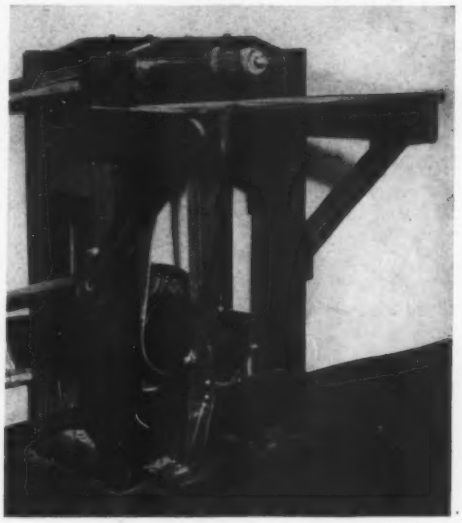
from an overhead shaft fitted with step pulleys; or from a counter shaft built into the machine and driven from a motor or drive shaft. Tight and loose pulleys with belt shifters could be used with such a counter shaft and without making the machine unduly difficult of construction.

The sander made in this school is arranged so the disk makes 557 RPM, and the spindles 1470 RPM; but speeds recommended by the manufacturers for their various sizes and brands of abrasive wheels could easily be obtained by adding other pulleys of the proper diameters. It would be useless to give the sizes of pulleys used here, as such information would be of no value to others whose drive shafts revolve at different speeds.

The table can be tilted to any angle below horizontal, and the angle fence can be set at any degree, from square to parallel with the sander disk's face to the right. It was thought best not to include a graduated scale of degrees in the machine, but rather to set the table and fence with the T bevel as required. Those who consider such a scale an advantage should have no difficulty in adding one.

The sander disks were turned, (on the shaft), from blanks made of alternate strips of black walnut and mahogany glued together to minimize the danger of warping.

The nut holding the disk in place on the shaft is set in babbitt on the axis of the disk, with its front edge flush with the surface. The babbitt is anchored to the wood by flanges made by counterboring to a larger size the ends of the center hole; and to the nut by deep "V" notches filed around its edges parallel to the face of the disk. Plate J illustrates the manner in which the babbitt is cast to hold the nut in center of the disk.



THE SANDER READY FOR USE.

Garnet paper is glued to the face of the disks. A good plan is to make two disks, and glue the paper to both at the same time, by bolting them firmly together through the center holes after placing paper with glue spread on the smooth side on the face of each. Several thicknesses of newspaper between the sanded surfaces will help to insure an even pressure over the entire area.

Sander spindles are turned, (from any kind of wood unlikely to split when tacks are driven into it), covered with heavy carpet tacked and glued in place, and used with sandpaper, emery cloth, or polishing cloth fastened

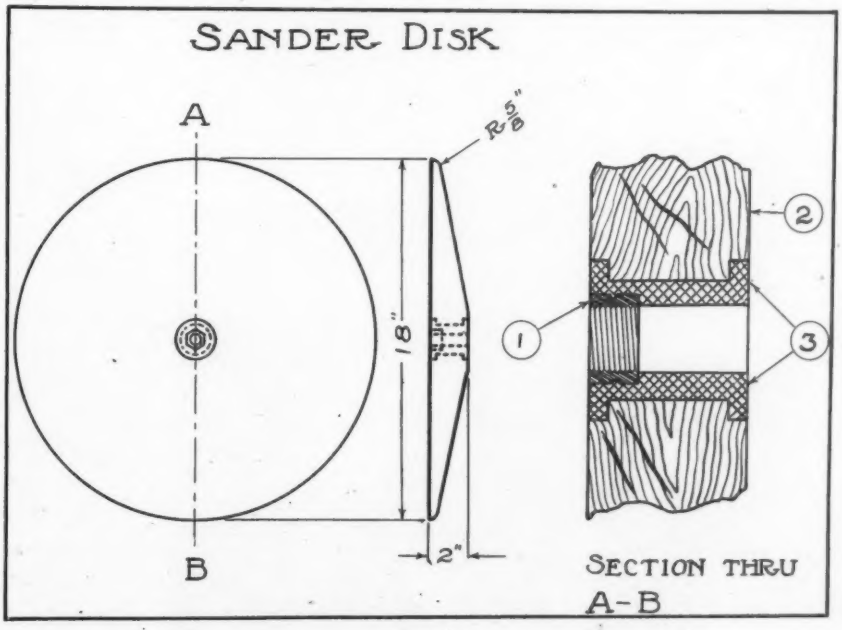


PLATE J.

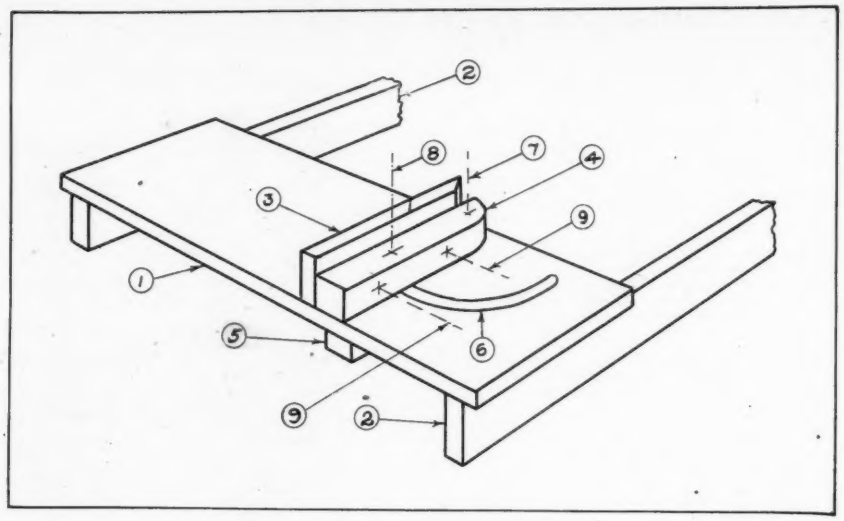


PLATE K. DETAILS OF TILTING TABLE.

over the carpet with tacks and heavy rubber bands as shown in the photographs. Pieces cut from discarded inner tubes serve the purpose very well.

Parts of Combination Sander.

Plate I.

1. Cap.
2. Table adjustment screws,—⅜″x6″ lag screws and washers.
3. Shaft.
4. Table.
5. Table support arms.
6. Table tilting brackets.

Plate J.

1. Nut.
2. Wooden disk.
3. Babbitt metal core.

Plate K.

1. Tilting table.
2. Table support bars.
3. Sliding fence.
4. Fence support bar.
5. Lower clamp bar.
6. Clamp bolt track.
7. Pivot bolt.
8. Clamping bolt.
9. Bolts clamping sliding fence to fence support bar.

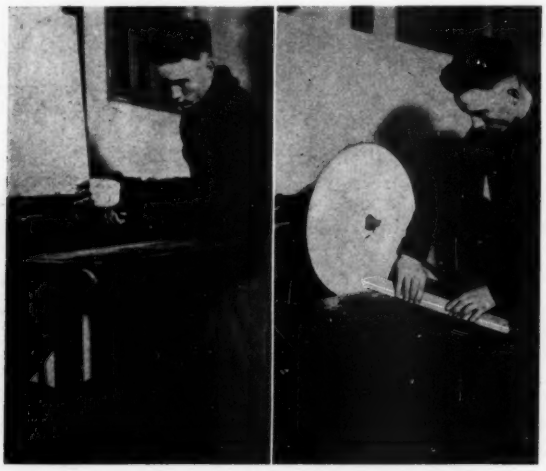
The fence can be set to cut anything from right angles to forty-five degrees to the right, by loosening bolt number 8, and turning the fence with its support bar upon the pivot bolt, number 7, and then tightening bolt 8 thus holding it firmly in the desired position.

The sliding fence is kept in the same position with relation to the face of the sand disk, regardless of the angle at which the fence is set, by loosening bolts 9 and 9, sliding the fence laterally along the face of the fence support bar, 4, until it reaches the required position and then tightening the bolts.

Materials for Combination Sander.

4 pieces 4″x4″x44″—20 ft. BM @ $100 M	$2.00
4 pieces 2″x6″x24″—8 ft. BM @ $75 M	.60
2 pieces 2″x6″x13″—2 ft. BM @ $75 M	.15
2 pieces 2″x4″x13″—1.5 ft. BM @ $75 M	.12
2 pieces 2″x2.5″x20.5″—5 ft. BM @ $75 M	.04
2 pieces 2″x4″x6″—1 ft. BM @ $75 M	.08
2 pieces 2″x4.5″x22″—3 ft. BM @ $75 M	.23
2 pieces 1″x3″x26″—1.25 Ft. BM @ $350 M	.44
1 piece 3-ply panel, fir, 12″x31″, 2.5 ft. @ $250 M	.65
1 shaft turned at local garage to details shown in Plate ——	2.85
8 carriage bolts ¼″x3″	.20
10 lag screws ⅜″x6″	.20
4 lag screws ¼″x3″	.10
20 washers ⅜″	.10
18 washers ¼″	.10
Total cost of sander	$7.81

(To be Continued in an Early Issue)



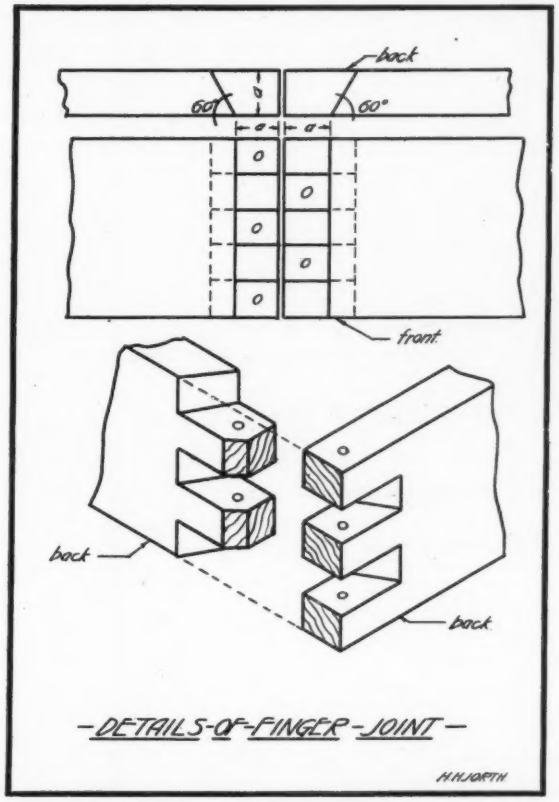
Reproducing Antique Furniture in the School

Article I—Concluded

Herman Hjorth, San Juan, Porto Rico

The group of tables illustrated and described in the January issue of the INDUSTRIAL-ARTS MAGAZINE would not be complete without two further card tables. These tables are distinguished in construction from the rest of the group by the fact that they involve the use of an additional leg, supported by a "finger joint".

The last two tables are probably best ascribed to the Hepplewhite style. George Hepplewhite was a contemporary of Sheraton, and of equal fame in the history of cabinetmaking, the socalled "Golden Era" (18th

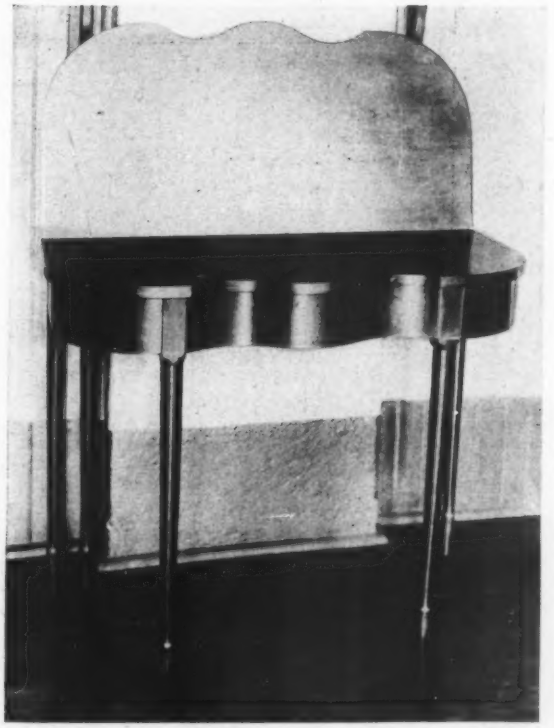


DETAILS OF FINGER JOINT.

Century). A characteristic of Hepplewhite furniture is graceful curves, both concave and convex, and slender tapered legs, both square and round. These tables, Figs. 5 and 6 differ somewhat in construction from those described above. Like these they have two leaves, one folding on top of the other. The lower leaf, however, does not revolve on a pivot, but is screwed to the rails of the table, while the upper one folds straight back, being supported by one leg, which swings out from the table by means of a socalled finger joint.

A finger joint is made in the following manner: Divide the width of the boards forming the joint into

CARD TABLE, FIG. 6.



CARD TABLE, FIG. 5.
Courtesy of Mrs. A. G. Wolf, San Juan, P. R.

five or more equal spaces and mark the divisions on both boards with a marking gauge. On the face of the boards lay out the length of the tenons equal to the thickness, and on the edge draw a line of 60 degrees and square down on the back of the boards, so as to provide for clearance. Mark the pieces to be cut out "o" and saw on the inside of the gauge lines. Chisel out waste pieces and trim with a chisel until tenons fit well together. Mark centers for pivot, place pieces together, so that they form an angle of 90 degrees, and bore 3/16" hole, preferably in a drill press, so as to insure accuracy. A nail will usually serve as a pin for the hinge. When

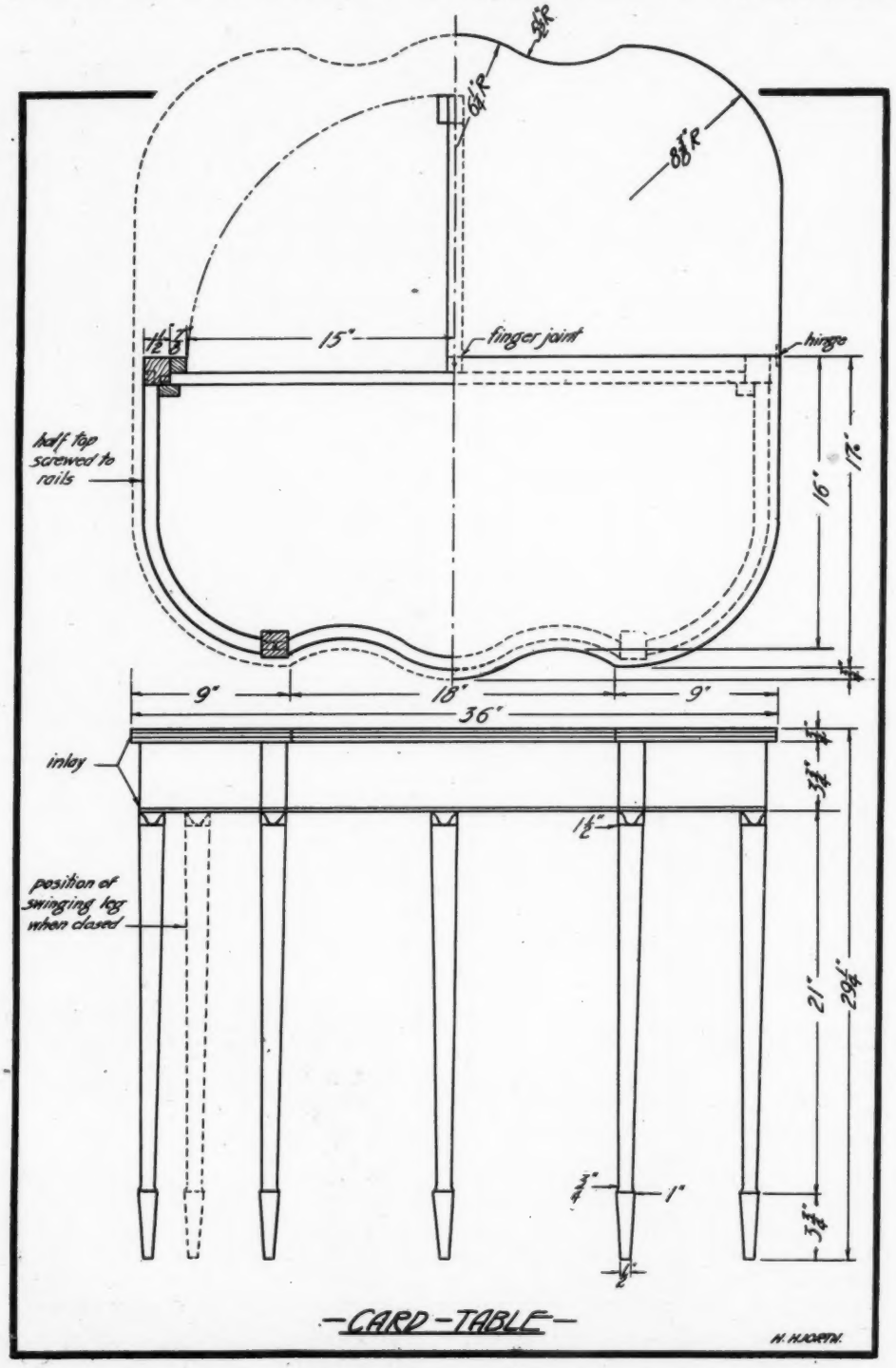


FIG. 5. DETAILS OF CARD TABLE.

the finger joint is pinned together it will be found that the tenons on the piece that is to be movable will project a little on the back side when the joint is half way open. Chisel off these projecting corners as shown in the drawing.

Note:—This is the conclusion of the first of a series of articles by Mr. Hjorth. The second will appear in an early issue.—Editor.

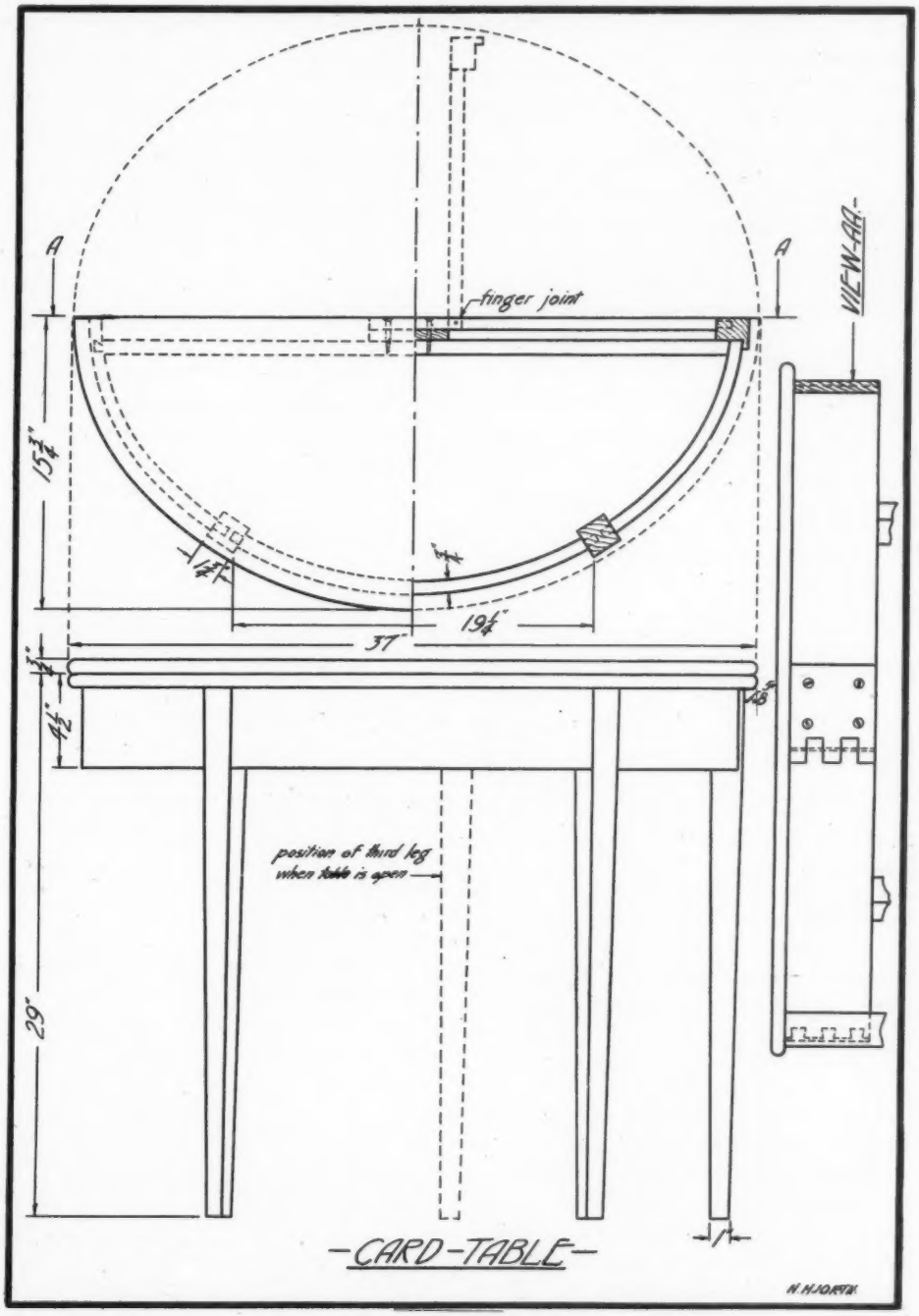


FIG. 6. DETAILS OF CARD TABLE.

I would rather plant a single acorn that will make an oak within a century and a forest within a thousand years, than sow a thousand morning glories that give joy for a day and are gone tomorrow. For the same reason I would rather plant one living truth in the heart of a child that will multiply through the ages, than scatter a thousand brilliant conceits before a vast audience that will flash like sparks for an instant, and like sparks, disappear forever.—Edward Leigh Pell.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

STRAIGHT OR CURVED.

At the annual conference of manual training teachers, representing that indefinite school subject in a western state, the question of design was left to the last minute of the program and then dismissed in an apologetic manner by the chairman, with this statement:

"We all realize that we should get a little art into our work by using more curves and fewer straight lines."

This statement indicates indifference to and ignorance of the most important element of manual training, from the educational point of view.

It is most unfortunate if, in striving for dexterity and vocational preparation as emphasized by vocational training, the teachers of quite another subject should forget the greater purpose of that subject, and spend their whole time and attention on manual and mechanical skill.

The statement above is analogous with the absurd statement from a teacher of English who might say, "We all realize that we should use more verbs and not so many nouns or adjectives."

Such a statement from a teacher of English would cause general protest and condemnation because of its absurdity. The choice of straight lines and curves seems to measure the conception of design which many teachers of manual training possess. To them, curved lines represent artistic things and straight lines utilitarian things, and since straight lines are easier to draw and cut and finish than curved ones, they can only indulge in curved lines by way of recreation.

We realize that the development of judgment in the choice of forms suitable to the expression of use and consequent beauty is a most difficult part of manual training, but to evade the study of design by such ignorant, apologetic statements as the one quoted, is so condemnatory of the teachers of manual training, that we would advocate a general house cleaning of the subject, and a new start.

No subject in the schools has made so little progress in the essentials of instruction, as manual training. With the fixed idea of developing exactness in execution, machines have been devised and used that have reduced training in dexterity to a minimum.

With little conception of developing the thoughtful, individual expression of the individual, elaborate trade projects have been attempted that are copied from prints or commercial models.

It was a hard struggle, not yet altogether successful, to bring the manual training teacher to the use of various joints in projects. It is now realized that the execution of these joints as part of a model with which the pupil has had no experience in the way of design, is but a makeshift in the educational progress of manual training.

Le us hope that a renaissance is at hand for manual training, which should serve a most important part in education.

PARENTS AND THE SCHOOLS.

The longer we live the more completely are we driven to the conclusion that parents are responsible for a vast amount of the troubles that face the schools.

More and more are the parents passing over to the schools and the teachers the unsolved problems of the home.

A noted authority estimates that two-thirds of the homes of this country are inefficient. This is not overdrawn. The strong probability is that not one-third of the homes are efficient. This would make it seem that the less than one-third of all our homes must take on the added burden of caring for the other two-thirds. This means that the one efficient home must care for two other inefficient homes. Thus far, however, the efficient home has refused to take on this added burden. The task has been passed on to the public school and other social agencies.

Even parents in the so-called efficient homes are anything but wise and efficient in their attitude toward the schools after their children have been entrusted to them. How many "efficient" parents ask for special privileges for *their* children just because they are *theirs!* Special privilege is the very negation of the principle of the public school. Everybody wants democracy *for the other fellow,* but special privilege for himself. Almost all parents say they want equality of opportunity and consideration, etc., for the children of all the people. They mean, of course, for the children of all *other* people. But for *theirs*—well, *they* are a little different, you know.

So, it is true that the parents are the big problem of the school. They must yet be educated and the task probably falls to the public school teachers. There seems to be no other agency that can in any adequate way meet the situation.

That the task of educating the present generation of parents is an impossible one may readily be conceded; but the teachers must struggle with the undertaking and do what they can. The hope is that through the efforts now being exerted the next generation of parents may be immeasurably more efficient than those of the present day.

LET'S GET BUSY AGAIN WITH MANUAL AND INDUSTRIAL ARTS.

A great many of our special teachers have been left in a state of confusion by the agitation and developments of the last few years in the field of vocational education. It has seemed necessary to many manual training teachers to change the name of their work without changing its character.

In cities, towns, and villages all over the country one can find little manual training shops labelled "vocational education." In the last few months we have seen in several cities some old-time cabinet makers teaching the old fashioned joint and exercise manual training under the name of "vocational or trade training." It was not vocational in any sense, and it was abominable manual training.

We venture the proposition that ninety per cent of all the shopwork in the schools of this country is, and should be, of the manual training or industrial arts type. We mean that it is not on a productive basis; that it is not designed primarily to produce skilled mechanics; and that it is not being pursued by those who have already chosen such work as their life occupations.

The small town high school with its limited equipment, and its one or two teachers who teach everything from whittling to boiler making, cannot give vocational courses. It is not desirable in most cases that it should. Not one per cent of the total enrollment would profit from such courses over and above what they would get in a good industrial arts course.

The whole problem, therefore, as we have said scores of times in these pages, is the problem of classification and grouping of the students with whom we work, on the basis of aptitude, inclination, economic condition, occupational outlook, etc. It's a question of knowing whom we are dealing with, and what we are driving at. When these questions have been attended to, especially in the town, village and small city high schools it will be found that the modern, highly enriched and vitalized courses in manual training or industrial arts meet the needs of the overwhelming majority of the students enrolled.

Vocational education, let it be said, is a crying necessity, but it is not for *everybody* in the high school. It is for certain well defined groups, neither worse nor better than other groups; simply defined by certain attitudes and aptitudes, economic condition, occupational leanings, etc.

The point of the whole matter is this: Let's give the right kind of vocational education to the right kinds of people. Let the manual training and industrial arts teachers feel under no compulsion to call their work "vocational," or to try to teach vocational courses for which they are not prepared, for which they have no adequate equipment, and for which there may be really no need nor demand.

Let's get back to business again with our good, high grade manual training and industrial arts. Let's quit trying to make it what it is not and shouldn't be. Let's cease to apologize because it is not something else. It has a big, clear, undisputed field. Let's cultivate it to the limit.

OUR DEBT TO CHILDHOOD.

We imagine we can sense a resurgence of that longing for a lengthened childhood. Under the lash of poverty, greed, parental shortsightedness and neglect, and childish displeasure with things childish and desire for the estate and position of maturity, the years of childhood have been usurped and ground down until almost nothing is left but the period of infancy.

In our struggle for reality, we have sometimes forgotten that what is real to maturity may be anything but real to childhood. Sordidness and shocking realities and the struggle to get ahead at all cost have robbed childhood of some of its sweetest pleasures, its most delightful make believes, and its most innocent dreams, and have clothed many an old man in Buster Brown and knickers.

Child labor laws have done much to bring back years to childhood, the lengthened and enriched school program is making its contribution, compulsory school attendance has lent its influence, but the virus is in the blood and it will take the effort of a generation to bring childhood into its own.

Meanwhile, we shall revel in the recollections of that happy, carefree, though not irresponsible, period, when childhood's span was measured by years of real living between infancy and youth which in turn lengthened out into other years ere the stress and strife and responsibilities of manhood came.

FIT AND UNFIT.

The Industrial arts comprise a variety of subjects peculiar in the opportunity they offer the teacher to develop tastes and skills of different sorts.

The greatest appeal any of these subjects make to the pupil is the desire to express himself thru the creation of some concrete thing. The child draws with interest only so long as he sees the opportunity to express himself. The boy works at the bench, or models or hammers at the anvil, with a vision of accomplishment before him. For this reason the vision must be kept clear in the process of teaching. Interest is the only means of securing attention that is worth securing. The appearance of attention under other discipline than interest is almost as worthless as inattention.

Let the discouraged teacher of manual arts consider that every live, normal child must have some interest in some phase of expression common to the manual arts. Fit the subject to the child for the child's sake and do not attempt to fit the child to the subject as you find it represented in a specified problem.

There is nothing aristrocratic about art that it needs to be enshrined in gold and red plush. There is no mystery about it that common folks cannot understand. It is only sadly unfamiliar to the average American. We want to make the American child more familiar with it as a part of his public school education.—Ella B. Johnston.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

A CABINET FOR FINISHING-BRUSHES.

A. R. Mitchell, Madison, Wis.

The most neglected corner, by far, in the average manual training shop is the finishing corner, or department. There seems to be more "ragged ends" to care for, keep in place and looking respectable, than even the most exacting teacher can generally manage. "A place for everything and everything in its place" should apply here as nowhere else, and this should especially apply to finishing brushes. Many thousands of dollars are squandered annually for brushes, too many of which are left to harden or lose their shape, rendering them useless or unfit for a first class job. The "fruit jar" idea is surely a poor one, as many readers will agree.

I have found the brush cabinet or safe,—as shown by the drawing—to be one of the most practical and convenient means of preserving both the texture and shape of brushes, that I have ever used.

In making this cabinet, it is better to make each section separately, assembling each by means of solder or rivets, as desired. Holes may be punched near the top of the back side, or loops provided, for hanging to the wall. Since different liquids are to be used in each section, according to the brushes, it is imperative that each section be plainly labelled.

This would make a good problem for a class in sheet metal work.

THE DUCK ROCKER.

Glenn H. Osborne, Ottumwa, Iowa.

This duck rocker is explained in the drawing of the writer's experience. It has always interested grade students. It should be painted in bright colors.

THE DRESSING CASE.

Chas. H. Stone, Julian Union High School, Romona, Calif.

This dressing case was evolved by the writer as a Christmas present for his daughter, and the original case was made from a ten cent box. It is best made from sycamore and cedar, trimmed with wrought iron, hand made hinges and drawer pulls.

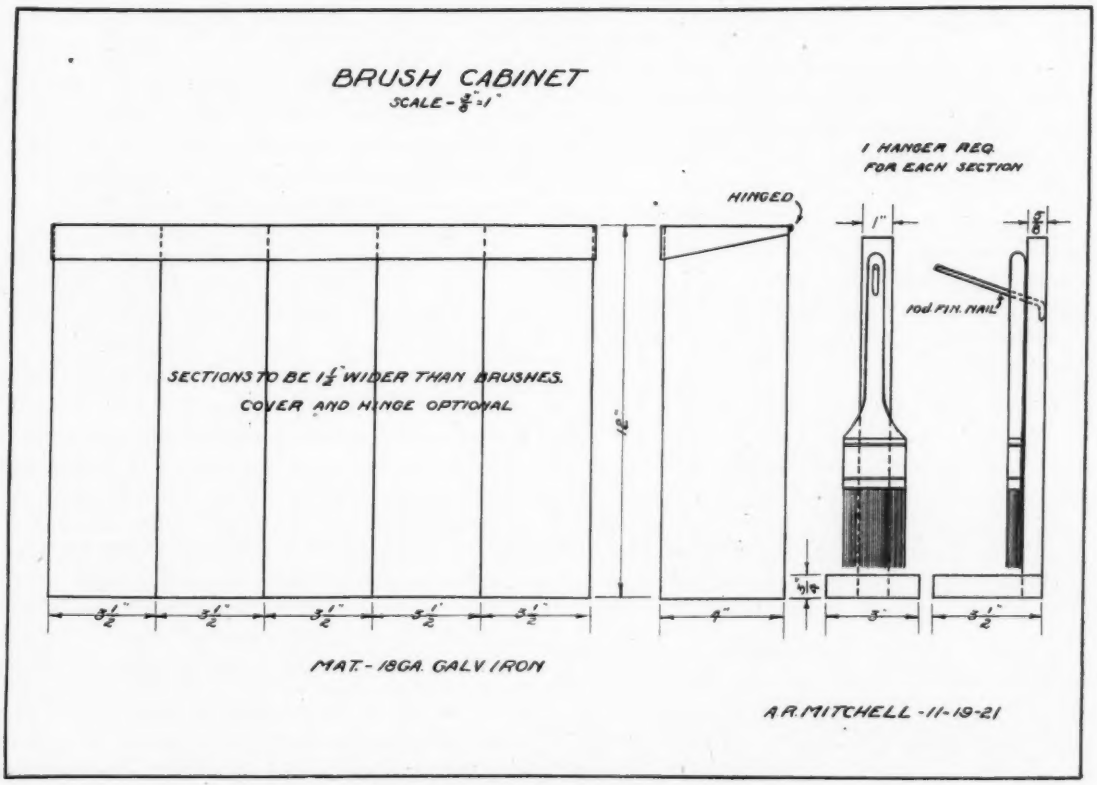
The drawer runners and partition between the small drawers should be put in place before the shelf is installed. The runners should go the full length of the drawers and raised 1/16" above the shelf. The top drawer has a pin tray and should be fitted with push tacks to keep it from being pulled all the way out.

The case is finished with several coats of white paint, and is finally enameled.

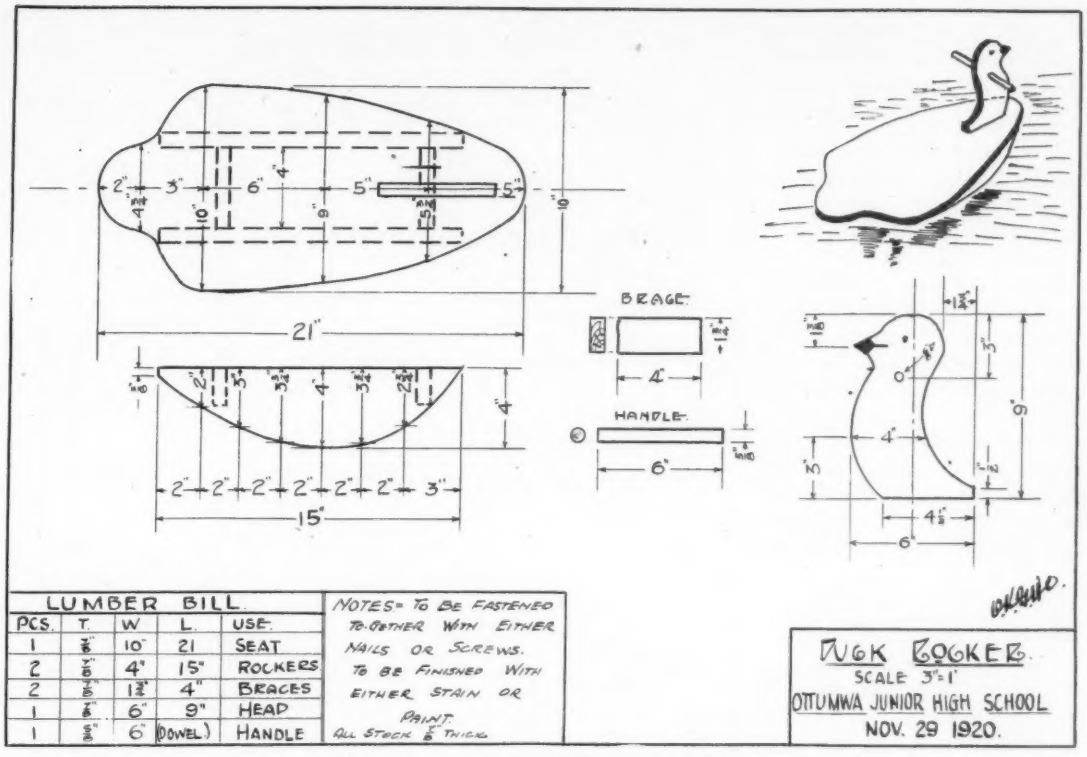
MAIL RACK.

W. J. Knupp, West Junior High School, Sioux City, Iowa.

In making out tentative courses of study in the manual arts department the matter of selecting projects that are useful and practical presents itself to the author as a



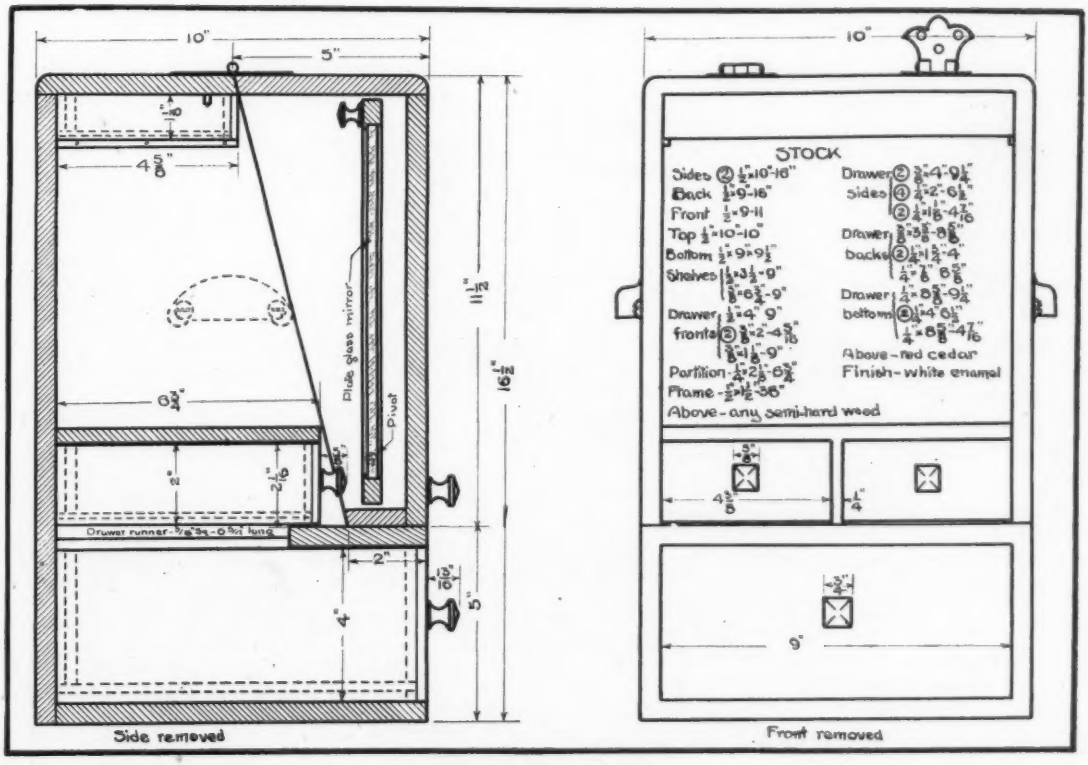
DETAILS OF SHEET METAL BRUSH CABINET.



LUMBER BILL				
PCS.	T.	W.	L.	USE.
1	⅞"	10"	21	SEAT
2	⅞"	4"	15"	ROCKERS
2	⅞"	1¾"	4"	BRACES
1	⅞"	6"	9"	HEAD
1	1½"	6"	(DOWEL)	HANDLE

NOTES= TO BE FASTENED TOGETHER WITH EITHER NAILS OR SCREWS. TO BE FINISHED WITH EITHER STAIN OR PAINT. ALL STOCK ⅝" THICK.

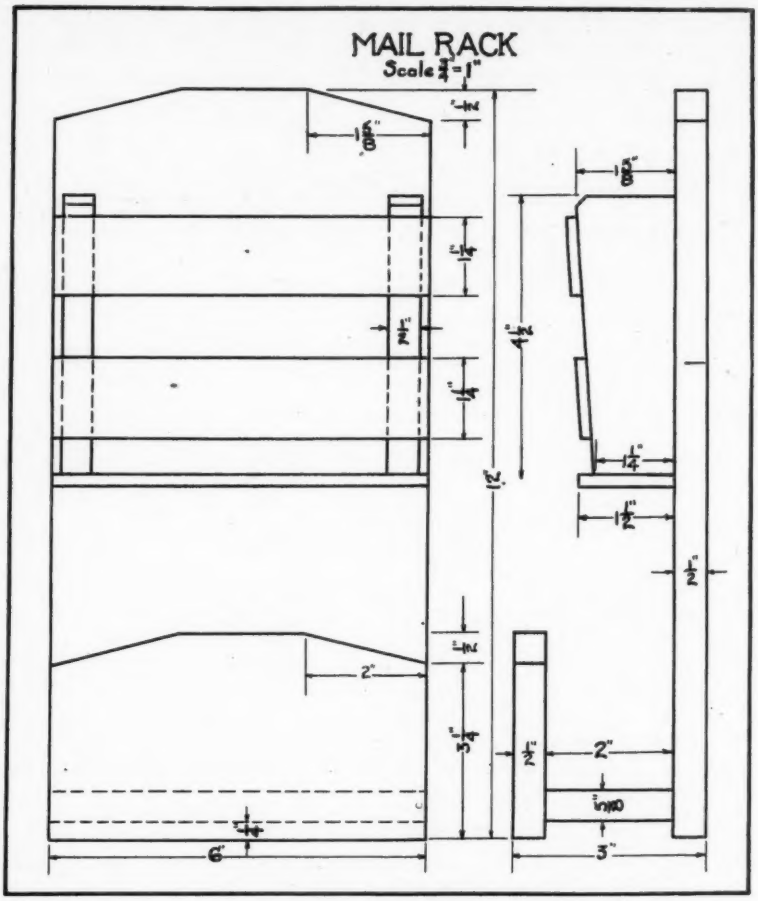
DETAILS AND LUMBER BILL FOR DUCK ROCKER TOY.



DETAILS FOR DRESSING CASE.

rather difficult task. The boy must be interested in what he is making. Problems useful in the home generally appeal to the boy's interest.

A mail box is a very common problem, especially the box type but this one is a little out of the ordinary. Most any wooden mail rack or box is preferable to a tin or galvanized iron box. This drawing shows a mail rack of two compartments, the upper for letters and the lower for second-class matter. The project involves very little material which in most problems must be carefully considered. Most of the author's pupils have used elm wood, stained, waxed or shellaced, while a few used pine and were painted the same color as the house.

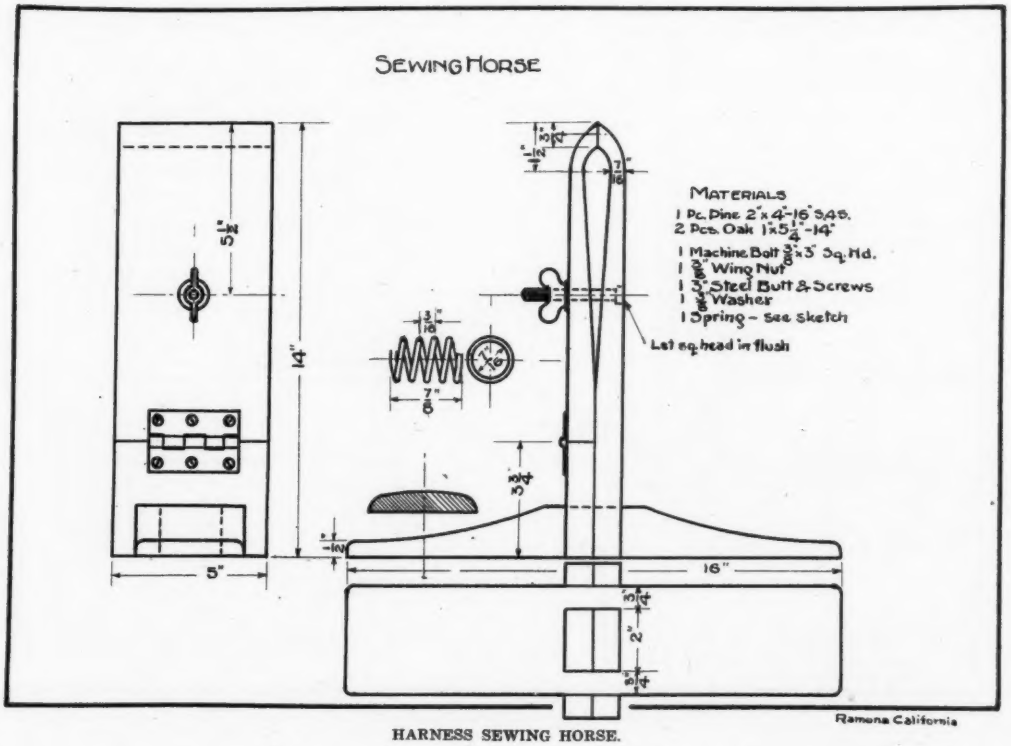


DETAILS OF MAIL RACK.

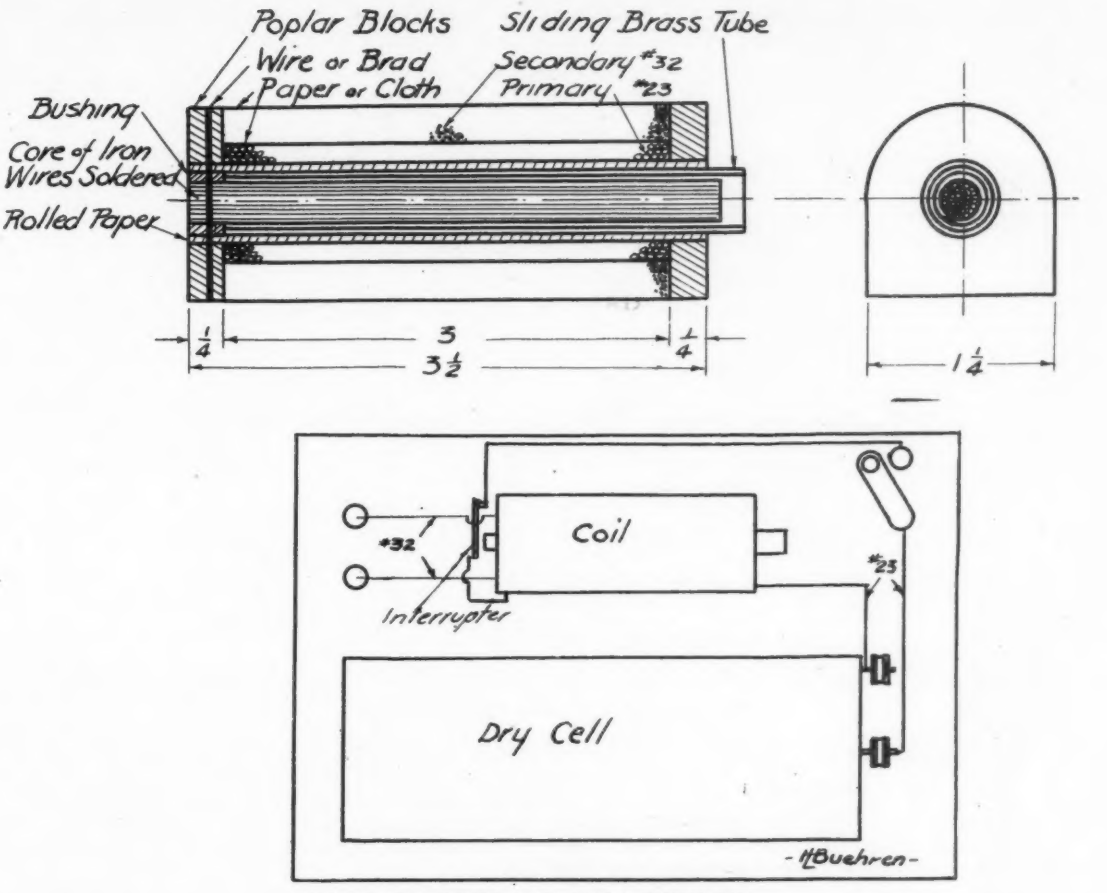
THE SEWING HORSE.

Charles H. Stone, Julian, Calif.

The original of this design for a sewing horse was brought to Southern California by an old Quaker from Indiana. We made slight changes in construction. It has one fault, that of catching the thread, and this can be helped by tacking a canvas flap to fall over the bolt end.



HARNESS SEWING HORSE.



DETAILS OF A SHOCKING COIL OR INTERRUPTER.

AN ELECTRIC SHOCKING COIL.

Henry L. Buehren, Bloom Junior High School, Cincinnati, O.

This coil, or interrupter, makes an excellent problem for any eighth grade manual training boy, being a job of woodwork and electricity combined. It is something boys are all wild to make and certainly gives untiring and satisfactory service and pleasure to elders as well at a very small cost compared to the price of the manufactured article.

A paper tube 3½" long is made by rolling and gluing together, getting the correct size by wrapping over a brass tube of ¼" or ⅜" diameter and about 4" long. This later allows for the moving or sliding of the brass tube in the paper tube. Next some No. 18 or 20 iron wire is cut in lengths just about ⅛" longer than the paper tube. These are then soldered or dipped in solder, having their diameter, assembled, just enough less to allow the brass tube to clear them in sliding. Two ¾" blocks are next cut and drilled to allow for a glue fit of the paper tubing in each one. A hole drilled through one block which will go through the paper tube and end of soldered wires holds them securely in place, if a brad be driven in. A stronger job can be made if a bushing be placed over the soldered wires before pinning. Next wrap three layers of No. 23 magnet wire carefully over the paper tube, and cover over with a piece of paper or cloth to separate the layers of No. 32 magnet wire, which is wrapped until tube is filled. Use insulated cotton covered wire each time, and allow ends to come out of coil to allow for tapping on wire to complete as shown on diagram of layout.

The make and break is gotten by using the interrupter from an old door bell if handy, or making a similar substitute. Wires from the terminals of No. 32 soldered to pieces of any pipe about 5" long, make good handles. A dry cell, a switch of any sort, and all wired as shown on a board about 6"x9" will finish the job. It may be boxed in if desired and the board hinged on, thus enclosing everything. By drawing out the brass tube with the switch on, the current may be run up from a very mild one to almost any unbelieveable amount for anybody who holds the handle.

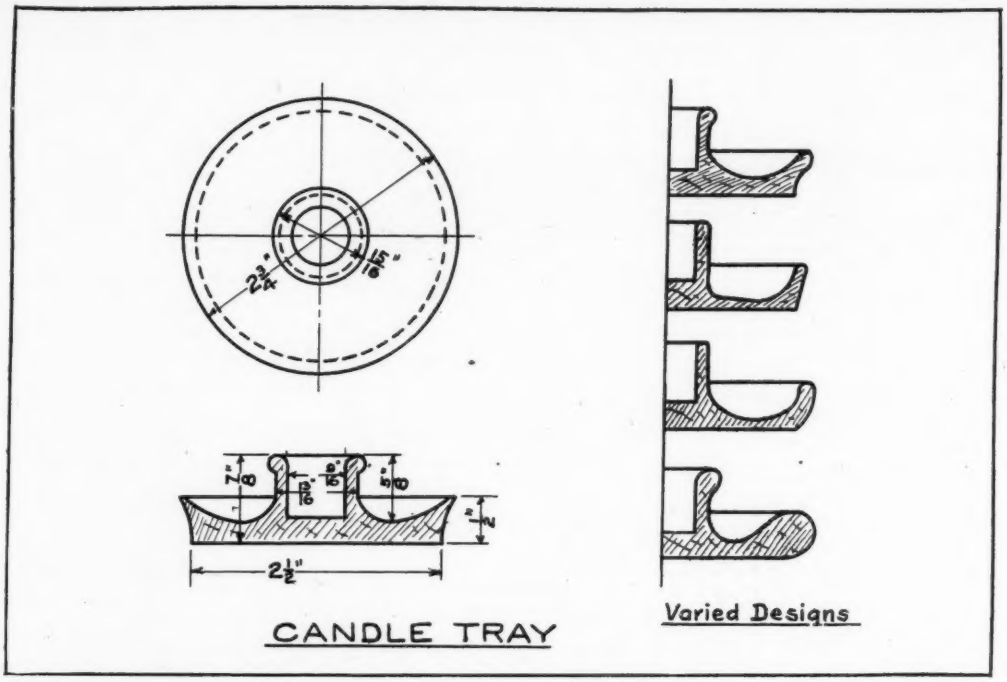
CANDLE TRAY.

C. L. Gormley, Waterloo, Ia.

This candle tray which was worked out in the school shops in Waterloo, has proved to be quite popular. It may be made of material taken from the shop scrap box and finished in various ways, from paint, enamel, stain, shellac, wax, oil, varnish, or French finish. We have found the tray quite popular as table decoration for banquets, and especially so at the Christmas season.

In turning them out we have used the small 2½ inch, center-screw face plate and fastened the material directly against the plate. Standard gauges and templets are made and used on each tray to keep them all to the same pattern. Production is carried out on a quantity basis; the class is divided into groups, each group or individual having a certain operation or part to do in the manufacture. The groups are changed from time to time so that each boy may follow the problem through and have a hand in each operation before the lot is finished.

I have found that this method will turn them out at a good speed and it works quite satisfactorily.



SUGGESTIONS FOR A TURNED CANDLE TRAY.

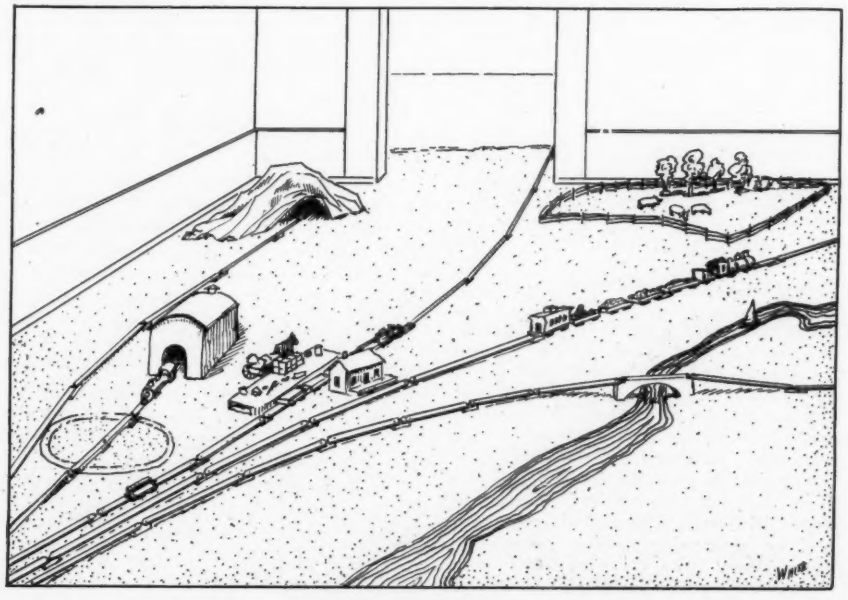
CONSTRUCTIVE PLAY.

W. W. White, Waterloo, Ia.

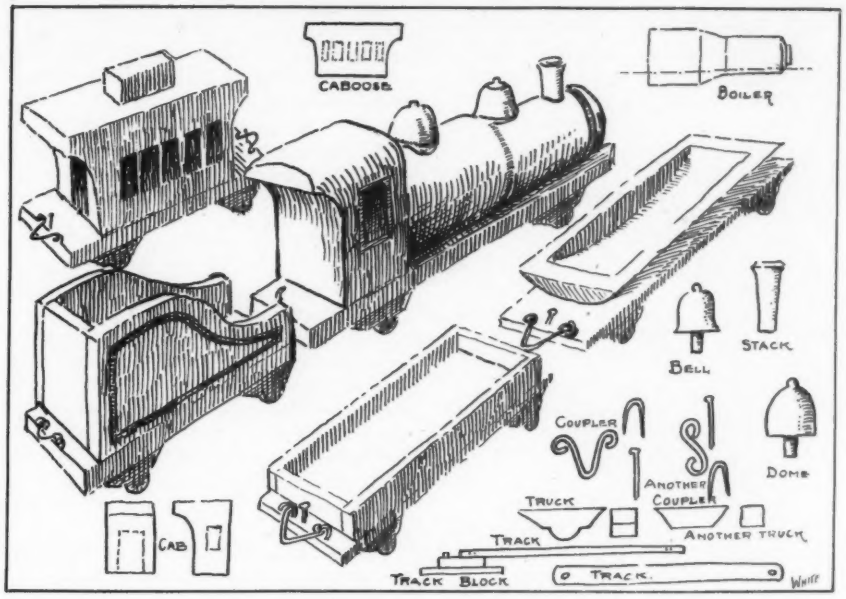
I have felt for years that the tin train gives the child very little to do except to haul it around on the floor, and I have often wondered why people complain when the youngsters tire of such toys.

As boys we built a crude lath track in the back yard and made little cars from cigar boxes and engines from curtain poles with clothespins for stacks. And what play we had! Cities grew, rivers were dug and of course bridges built, elevated tracks, turn tables, switches, sand houses and round houses followed. An old tin vat buried in the ground made a lake in which were real fish, etc., etc. I could enjoy playing with these things even today.

With these pleasant experiences in mind, we set to work on a plan for an indoor train that we could make in the school shops. As a result we made nearly a hundred sets last year. One of these sets came home to my 5-year-old boy. It has been almost a year now that we have observed him with these toys. Some tin things he got at the same time are smashed and gone long ago but



TOY RAILWAY LAYOUT.

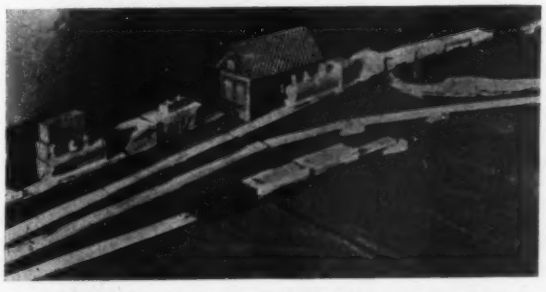


SUGGESTIONS FOR A TOY RAILROAD.

these staunch trains remain and not a day passes but that they are used, sometimes for a half day at a time in a never ending variation of forms; bridges, viaducts, crossings, switching yards and overland routes, never twice the same and always something to study out. No there are no wheels on these but that has never mattered in the least. In fact the tin car his uncle gave him afforded the most pleasure after the flimsy wheels had come off.

This set was designed for indoors but it can be used outside and even fastened to stakes driven in the ground as we had them in the old days. The parts are all shown in the sketches of Fig. 1 except the turn table which is a simple affair. Knowing that passenger cars have little interest for the child we built only cars for service. We can haul things with these, even parts of the equipment necessary for more track building. Pumpkin seeds make a fine cargo. But why go on. Any child will evolve combinations a grown up could never imagine.

Fig. 2 gives a hint of just one layout. Here we have the three main lines to Kansas City, St. Louis and Chicago, with the K. C. division crossing the Mississippi just at the place where the blue print paper is the right size for the bridge; the bridge was made of scraps from the band saw. We know there are several loads of domino coal in the mine there in the distance and if that ship is to sail under that bridge, extensive repairs and improvements are necessary but a few blocks, rightly placed will do the trick.



TOY RAILROAD MADE UNDER THE AUTHOR'S DIRECTIONS.

And all the noises go with the set, the sound of the bell, the whistle and the puffing of the engine as it makes the grade toward the viaduct, even the clatter of the trucks are sometimes heard as they bump against the joints in the track.

This we claim is real constructive play and the staunch way in which these toys are made make them good for a long time. The only repairs necessary on our own set were two or three couplers. The tracks were made of lath, the engines from discarded turning exercises and the cars from thin goods boxes. We sell them at two dollars per set. They are worth $25 to the child.

WHY LUMBER IS STEAMED DURING KILN DRYING.

From the questions asked by numerous students taking the short courses in kiln drying at the Forest Products Laboratory, Madison, Wisconsin, it is evident that many who operate kilns and handle lumber do not understand the object of steaming lumber in a kiln. There seems to be a common impression that the purpose of steaming lumber is to "remove the sap." This is far from being the fact, for when lumber is steamed it takes on moisture, as a rule, instead of giving off anything.

The reason for steaming lumber during drying depends on when it is done, but nearly always the treatment is given for one of the following purposes: (1) to heat lumber through quickly at the start; (2) to relieve stresses which otherwise would produce checking, casehardening, and honeycombing; (3) to equalize the moisture content and condition the lumber ready for use at the end of the run; (4) to kill fungi and insects in the wood.

When lumber should be steamed, how long the treatment should last, and what temperature should be maintained are points which have been determined at the Forest Products Laboratory by experiments on many species of wood. A thorough understanding of the steaming operation is essential, because the whole kiln charge can easily be ruined by too severe a treatment. One of the chief needs of many commercial kilns is proper steaming facilities, without which a high degree of success in the artificial seasoning of wood is impossible.

VOCATIONAL CIVICS AND INDUSTRIAL ARTS.

With our present equipment it is inadvisable to handle grades lower than the seventh in industrial work. At the Lincoln school we have an industrial center, where boys of the seventh and eighth grades receive their instruction. They have the customary one-half day per week for the work.

The course is planned to give an industrial insight or overview. It may better be called occupational insight or overview for the course is broadened to include all possible ways of making a living. It is hoped the doors of many industries, businesses, professions, trades and occupations are opened, so that these boys get an understanding of the actual working conditions within these lines of work.

In the seventh grade the boys are taught mechanical drawing, machine drawing, architectural drawing, tracing and blue printing. This work is made of such a nature as to include working drawings of problems to be constructed in the shops later in the year.

In the second years, or the eighth grade, after complete working drawings, tracings and blue prints are made, the boy advances into the elementary cabinet work, where he constructs the problem he has designed and drawn. It is usually required that these problems include some form of rush, cane, splint or fibre weaving. The weaving adds interest and provides an opportunity to learn in several different trades.

Secures Aid of Local Laundry.

Many other trades are demonstrated so that the boy gets at least an understanding of what is actually involved in work at the different trades. An example of such demonstration work is like this: With some few simple wood patterns, pattern making and core making are explained. Then with these patterns a drag, a cope, a moulding board, moulders' tools and some sand; moulding is explained, likewise the life of the moulder, his wage, etc. Our materials have been given us by a local foundry.

In almost any location and situation such materials can be borrowed from a local foundry if they are not donated. In case of these trade demonstrations, students turn in written reports. Most academic teachers are found to be very glad to have such written work substituted for theme work so that the boy kills two birds with one stone and does more efficient work in both departments.

Note: In response to a request made by the Industrial Arts Magazine, Mr. R. D. Todd of Ottowa, Ill., outlines in the following article briefly the manner of correlating the vocational civics and industrial arts in that city.—*Editor.*

All such laboratory work is planned to provide actual participation in as many lines of work as is possible, keeping in mind at all times the aims of the course.

In order to cover a broader field of occupations more suitable to all students, a term paper is required of each student. The paper is of occupational nature. After careful instructions as to the vital reasons and how to proceed (suggestive outline given to pupils), all pupils are asked to write a short description and explanation of the trade, business or profession in which they think they want to enter, or, in which they think they are most interested.

Students' Papers Read in Class.

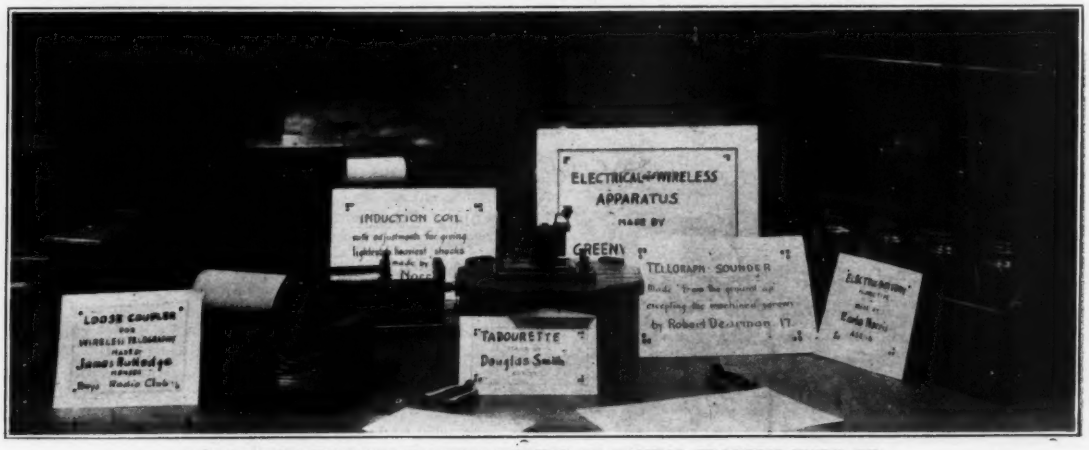
Such things as these are included in the outline: training necessary to best enter such trade, business or profession; cost of training; where it can be gotten; cost of offices and equipment; probable returns after establishment in the work, and the advantages and disadvantages of this trade, business or profession over others. Such papers are required early enough in the year that some can be read in class and all pupils derive the benefit from them, in aiding them to become interested in finding where they fit occupationally.

From this enlightment, through members of their class and from various sources such as library books, magazines, local tradesmen, business men, professional men, etc., boys find defects and advantages in their own, as well as the other fellow's choice. They evaluate these choices.

The laboratory work together with this collection of outside data provide a wide range of industrial work as well as information on many other occupational lines in which these boys are interested. When this instruction is impartially boiled down and reasoned out in connection with the shop courses, we find it of unusual value. We feel that this work in vocational finding or vocational civics, which is briefly described above as in connection with the shopwork in seventh and eighth grades, to be of unusual importance and from experience consider it indispensable to our system, and further urge all schools that have no good substitute for it, to establish a similar system according to their needs.

The best method of carrying out this vocational civics course is undoubtedly in direct connection with industrial arts or exploratory industrial courses.

The big problem is to secure teachers with a broad knowledge of a large number and a wide variety of occupations, who are vitally interested in the adolescent boy and who are sincerely anxious about his future.



ONE OF FIVE WINDOWS SHOWING EXHIBIT OF MANUAL TRAINING WORK BY GREENVILLE, S. C. HIGH SCHOOL AND COMPERDOWN CLUB BOYS.

OUTLINE FOR THE STUDY OF A VOCATION.

Jay D. Rudolph.

Vocational Guidance for the boy who must leave school at the age of 14, 16 or 18 years of age.

Printing.

1. *Importance of the Occupation:*

(a) Today printing could hardly be dispensed with in the Community. Our newspapers are the "Voice of the People." It is said that the linotype operator is "The Hand that Informs the World." The World's War would have been lost without the Printing Press.

(b) Mostly all trades use printing in some form or other—office forms, stationery, factory forms, etc.

(c) Printing ranks fifth in industry. The social standing is high. Let us think of the two candidates that ran for President—they were printers. With the new sanitary devices installed in the modern print shop, it makes a desirable and healthful occupation.

2 *Division of the Work:*

(a) Jobs in the printing trade may be classified thus: Compositors, Stonemen, Typesetting Machine Men. Proofreaders, Bindery Men, Pressmen, (job and cylinder) and Property Men.

(b) The Compositor sets the job; Stonemen lock it in the chase for the press; Machine men set the job either on the linotype or monotype machines; Proofreaders read the job after it has been set and mark the errors; Bindery men cut the stock or bind the job, if it be of that nature; Pressmen print the job on job or cylinder press; Property men in the large shops look after the supplies of the composing room and have charge of all the cuts and engravings.

3 *Kind of Boy Wanted—Qualifications:*

(a) Appearance should be neat and tidy. High school education if possible. Health should be good, and a liking for indoor work.

(d) Special Traits: Should have a talent for drawing. A keen eye for colors. Like machinery, also have an artistic taste. Good habits.

4. *The Start:*

(a) If in the composing room; the first duties will be to keep the lead and slug rack in order (putting away leads and slugs). Learning the case. Setting simple jobs, such as name cards, business cards, envelopes or corner cards from re-print copy.

(b) Proofreading: learning the proper proofreader's marks and proper way to mark proof.

(c) Stonework: locking-up small forms, cards, envelopes, and single page of straight matter.

(d) Bindery: cutting stock, making pads and notebook covers, etc.

(e) Presswork: feeding simple jobs and making them ready for press.

(f) Attitude: Sticking on the job. Patience, not getting discouraged. A willing way in going at a job.

5. *Opportunities for Advancement:*

(a) Composing room: Head Jobber, Layout man, Foreman.

Proofroom: Head Proofreader.

Stonework: Head Stoneman.

Bindery: Foreman.

Presswork: Feeder, Pressman and Foreman.

(b) Superintendent of plant. Manager.

(c) Promotions usually come to those who are constantly studying the intricacy of the trade—taking an evening course or a good course by mail.

6. *Hours:*

Practically all printing offices are working eight hours a day, some are working 44 hours a week.

A. H. EDGERTON,
Director of Vocational Guidance,
Detroit, Mich.

7. *Wages:*

The scale of wages run from $25 to $60 per week. Many printers are making more, with bonuses and overtime.

8. *List of Approved Institutions Where Training May Be Had:*

Carnegie Tech. Inst., Pittsburgh, Pa. Indianapolis School of Printing, Indianapolis, Ind. I. T. U. Evening Course (by mail), Indianapolis, Ind. Inland Printer Course (by mail), Chicago, Ill. Trade Schools in various Cities.

9 *Books and Magazines to Read:*

Inland Printer, Printing Art, American Printer and Industrial Arts Magazines. DeVinne's History of Printing. Textbooks—Printing for School and Shop, by Henry. Vocational Printing, by Ralph Polk.

BUSINESS METHODS IN THE CLASSROOM.

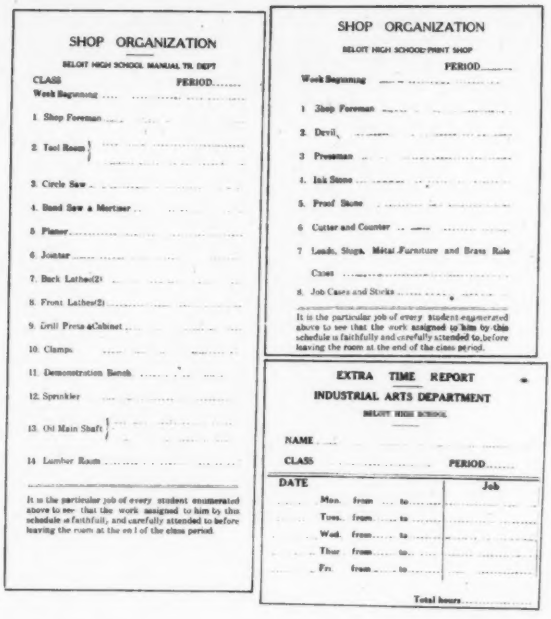
Earl W. Thrall, Director of Manual Arts, Beloit, Wis.

As much as possible, a boy's school days should train him for the conditions in which he will find himself when he launches out to fill his place in the busy world. His contact with the business methods of the professions, of the financing of manufacturing, and of marketing is a minus quantity. He little knows of the vast network of small cog wheels, all securely interlocking to function and produce the greatest power and result for a great system.

These things cannot be taught by assigned lessons. In fact, they are usually learned by hard knocks and expensive experiences.

Practical use of good business principles and systems in the management of shop classes enables the pupil to recognize the benefits of system and organized effort. Naturally, these examples will be done on a small scale as compared to a regular production business, but if the system is recognized by the pupil, even in a small way, it has well served its purpose. "Big oaks from little acorns grow", so must all of our ideas be developed from small beginnings. In the school shop classes, typical shop conditions exist. A systematic organization to be followed daily in these classes, gives each boy an idea of the different steps encountered in production processes.

The cards here shown have been used very successfully in high school classes in woodworking and printing. This method makes each boy responsible for a definite job. Confusion at cleanup time should be eliminated because each boy has his individual assignment. It is easy to check up on the boy as well as on the job, even after the



SHOP ORGANIZATION

BELOIT HIGH SCHOOL MANUAL TR. DEPT

CLASS PERIOD.....

Week Beginning .....

1. Shop Foreman .....
2. Tool Room .....
3. Circle Saw .....
4. Band Saw a Mortiser .....
5. Planer .....
6. Jointer .....
7. Back Lathes(2) .....
8. Front Lathes(2) .....
9. Grill Press &Cabinet .....
10. Clamps .....
11. Demonstration Bench .....
12. Sprinkler .....
13. Oil Main Shaft .....
14. Lumber Room .....

It is the particular job of every student enumerated above to see that the work assigned to him by this schedule is faithfully and carefully attended to before leaving the room at the end of the class period.

SHOP ORGANIZATION

BELOIT HIGH SCHOOL PRINT SHOP

PERIOD.....

Week Beginning .....

1. Shop Foreman .....
2. Devil .....
3. Pressman .....
4. Ink Stone .....
5. Proof Skate .....
6. Cutter and Counter .....
7. Leads, Slugs, Metal Furniture and Brass Rule Cases .....
8. Job Cases and Stones .....

It is the particular job of every student enumerated above to see that the work assigned to him by this schedule is faithfully and carefully attended to before leaving the room at the end of the class period.

EXTRA TIME REPORT

INDUSTRIAL ARTS DEPARTMENT

BELOIT HIGH SCHOOL

NAME .....

CLASS ..... PERIOD.....

DATE	Job
Mon. from ... to ...	
Tues. from ... to ...	
Wed. from ... to ...	
Thur from ... to ...	
Fri. from ... to ...	
Total hours	

class has been dismissed. The cards are changed weekly so that no boy has the same job for more than one week at a time, but is moved ahead through all of the different steps and jobs in regular order. He learns more about working with others, about supervision, about machinery and the shop in general; the instructor learns more about the boy as an individual. These cards may be altered or changed to fit any shop or shop conditions. Different machines and equipment will bring out the different duties to be performed.

The extra-time card was made to keep a detailed record of work done outside of regular class periods, whether at home or at school. This record is completed and handed in by the pupil at the end of each week and the card is checked by the instructor, the credit is transferred to the class book and the card is then filed or destroyed. It is a labor saving device as well as a definite check for both teacher and pupil.

Any method or system which is practical for use in business is usable in the school shop. Instructors are always pleased to have a pupil bring to class a new or original idea. Pupils recognize it and appreciate it equally as well when their instructor does likewise.

SAFETY FIRST—A SPECIFIC PLAN FOR TEACHING IT.

To the Editor:—

I have read Mr. Edward H. Crussell's article headed "Safety First—Common Sense a Poor Second."

He promises more in an early issue but I take a chance on submitting my own method before hearing him out. In a measure I agree with him on printed rules, but I suggest a method which encroaches on his pet aversion. In defense of it I can say that I've had classes of high school boys working with machines for full seven years and so far have never had a boy "draw blood" at a machine. It may be nonsense but it works.

At the beginning of the year I pass out mimeographed copies of a catechism on the several machines. I take one machine at a time and go over the answers with them. The order then is that no boy shall use a machine until he has passed a satisfactory examination on that piece. The work "satisfactory" doesn't mean a 75 per cent examination but one which shows a complete understanding. Further, any boy who shows a disregard of these rules is barred from the machine for two weeks. Once is generally enough.

This catechism must be varied for the type of machine in individual shop but I give here the section for the band saw as typical of the others. Under one or two of the questions I give suggestions of the answer required.

Band Saw:

1. For what type of work is it essentially designated?
2. How should the material be fed to the saw?
3. What is lead?
4. What are the chief abuses of the machine?

Feeding material before machine has picked up speed.
Holding work too rigidly.
Backing out of long cuts.
Forcing against a dull saw.
Too much tension on saw.

5. What are the chief dangers in using a saw? (Here are required five or six specific examples.)
6. When saw breaks in what direction does it fly?
7. Where is the machine oiled?
8. What precautions should be taken before starting saw?

See that material will clear guide.
See that guide is in true alignment.
See that throat is clear.
See that table is level.

9. What provisions are made for sawing angles?
10. How is a band saw coiled for storage?
11. How is tension adjusted?
12. For what purpose are (here are listed several essential parts of the type of machine in the local shop).
13. If saw fails to start on closing switch what should immediately be done?
14. If saw breaks is it then useless?

The answers to these questions pretty well covers the use of the band saw. It is not only necessary to explain to a boy the dangers of using a saw but why they are dangerous. To do this he must know the machine and how it works. Or reversing the idea if he knows how the machine operates, he will know the abuses of it and its dangers. Most machine accidents come as a result of ignorance of the machine.

JAMES K. SCHALLENBERGER.

Morenci, Ariz., Nov. 30, 1921.

FROM "AN INDUSTRIAL-ARTS PROGRAM FOR THE JUNIOR HIGH SCHOOL."[1]

Leon L. Winslow, Specialist in Art and Industrial-Arts, University of the State of New York.

In addition to the required general work in art common to all junior high school courses specific instruction in art should be given continuously in connection with all types of industrial arts work. There is an art side to each of the industrial arts, for in the last analysis art may be said to be realized in any worthwhile productive job done well. I like to think of the subject of industrial arts as consisting of art, science and economics, a combination of parts in which "the greatest of these" is art.

In this connection **art** should be regarded as synthetic. It involves self-expression which may prove to be self realization for some of the pupils; it may be made to open up unexplored channels for the free exercise of the creative impulse; it involves practice and doing in which is involved proportion, construction, color, taste and appreciation.

Science consists in knowing how; without it art cannot flourish. It has to do with the explanation of physical phenomena and physical laws. It has also to do with methods of combining materials, with technical information and with principles of aesthetics which govern choice.

Yet of what avail are science and art in the educative process if the significance of it all is not to be put across to the pupil? **Economics** as a phase of industrial arts should provide this rational basis of significance. It should acquaint the pupil with the "what-it-is-all- about" phase. It should justify the art and the science by calling attention to their importance in a work-a-day world; it should acquaint the pupils with facts of social value and importance and it should tie up the instruction given with related literature, geography, arithmetic and history. Ultimately and perhaps incidentally the whole field of vocational possibilities and opportunities will be opened up to the pupils.

[1]Address delivered at the Convention of the New York State Teachers Association, held at Rochester, N. Y., November 22nd and 23rd, 1921.

SCHOOL CRAFTS CLUB MEETING.

The first round-table meeting of the School Crafts Club for the year was held in the Ethical Culture Hall, New York City, on Saturday evening, December 17th.

Mr. Charles R. Bostwick, of the Poppenhausen Institute, Long Island City, N. Y., gave a most interesting illustrated talk on "Industrial and Applied Arts in the Hawaiian Islands." Mr. R. W. Wolfe, teacher of shopwork in New York City, conducted a round-table group with many ingenious models to illustrate his talk on "Mechanical Aids in the Teaching of Shopwork." The other round table "The Forum" was conducted by Mr. Allen D. Backus, of Newark, N. J., who took as his topic, "Mechanical Drawing in the Grades." The subject proved to be of much interest and many valuable points were discussed.

R. F. Hemion.

ANNUAL GET-TO-GETHER DINNER OF THE VOCATIONAL EDUCATION SOCIETY OF BOSTON.

The Annual Dinner of the Vocational Education Society of Boston was held on Saturday, December 17th at Hotel Bellevue, Boston. Mr. George F. Hatch, president of the society presided and outlined the aims, purposes and future possibilities of the society, hoping that it would take its place as foremost among the Vocational Associations of the country.

Following the dinner an excellent musical program was rendered.

Cello Colo—Mr. Charles Tierney, Assisted by Mr. Logan, Piano.

Song—Mr. Charles Doherty, Assisted by Mr. Logan, Piano.

Song—Mr. Gordon.

Cello Solo—Mr. Charles Tierney.

Mr. John C. Brodhead, assistant superintendent of the Boston schools, the first president of the society, reviewed the history of the Association from its beginning, 21 years ago with seven members to its present 300 members.

He paid a tribute to the loyalty and perseverance of the early members, who through many trials and viscissitudes, were the means of bringing the society to its present strength and influence among the Vocational Association of the country.

Mr. James Phinney Munroe, ex-chairman of the Federal Board for Vocational Education spoke on **"Some Reminiscences from the Field of the Vocational Board."** Among other things he stated that the Federal Board was confronted with two big problems, first, the organization of the technicians and mechanics for their part in the war, and second, the hospitalization, rehabilitation and re-education of disabled soldiers and sailors. He disapproved of the present plan of using the cantonments for training the disabled veterans, stating that the established schools and colleges could do the work more efficiently and effectively. The Federal Board met with considerable opposition in the development of its plans and schemes and in carrying out its ideas, which were somewhat of an innovation in the established order of governmental procedure.

The policy of the Federal Board was a sincere desire to cooperate effectively with the different states and to assist them in solving the problems in vocational education which pertained to their particular community.

Many splendid experiments in vocational education are being instituted in many parts of the country with considerable success. His experience in traveling all over the country has made him an optimist on the United States. There were many hopeful and cheerful signs of the ultimate success and progress and prosperity of the country.

Vocational education was developing so fast and taking its place in the established order of educational systems, so much so that the whole system of education was being revised to conform to the new ideas involved.

Compulsory part-time education was making remarkable progress and is being established in many of the states. He ventured the suggestion that because of the development of vocational education we would experience some remarkable changes in education in the next fifteen years.

Mr. C. Howard Walker, spoke on "Industrial Art." He said that in 1860 industrial art was in a demoralized state because of the prevailing practice of those times of imitating all worth while artistic objects. The buildings erected at the Chicago Exposition in 1893 exerted a most beneficial and wholesome effect on the architecture of the United States since that time.

He made an urgent plea to the teachers to guide and instruct their children so that the idea of efficient service and the joy of accomplishment will be ever present in the mind of the developing child with the object in view of training a generation of artisans who will make their contribution to a new era of artistic and beautiful objects.

The members present at the dinner expressed the opinion that it was one of the most enjoyable and instructive of recent years and an event to be looked forward to among the vocational teachers in Boston and vicinity.

VOCATIONAL AND PART-TIME TEACHERS MEET.

The second of a series of meetings for vocational and part-time teachers was held December 6th in the Albany City Hall. Mr. E. A. T. Hapgood, Director of Vocational Education for the city of Albany, presided. Mr. Hapgood pointed out that the growth of the department had made it inadvisable to hold a number of general meetings and had made it necessary to conduct frequent group meetings and to make shop visits to the individual teachers. He pointed to some of the advantages to be obtained from worthwhile meetings such as cooperation, publicity for the work, increased breadth of view and the help which comes through a knowledge of what the other teacher or supervisor is doing. Mr. Hapgood outlined his plans for four future meetings to be held during the period from January 17th to and including June 5th, at the several schools in the city. Miss Rose Hughes and Mr. John Park gave tentative outlines of their plans for these meetings, including some of the subjects for discussion.

Supt. C. E. Jones spoke briefly of the growth of vocational education within the past few years and of the value and development of the part-time school.

Director L. A. Wilson of the State Vocational Department, gave statistics showing the great advancement in vocational education both federal and state within the past four years, and in the growth and development of the part-time schools in the nation and state. He mentioned the good work being done in the local part-time schools and urged the vocational teachers to unite with the teachers of the Capital District in the organization of a Capital District Vocational Club.

Machine Drawing.

By Carl L. Svensen. Cloth, 214 pages, illustrated. Price $2.25. D. Van Nostrand Co., New York.

This book presents machine drawing as a correlation between mechanical drawing and engineering and offers in the shape of informational definitions, discussions, tables, illustrations, and drawing problems a practical introduction to college engineering courses. The work opens with a restatement of elementary principles of mechanical drawings and types of machinery fastenings. It then takes up very completely the special methods of machine drawing and dimensioning and in subsequent chapters treats machine details, bearings and pulleys, shafting and couplings, jigs and fixtures, cams and gears, piping, etc.

About two hundred problems arranged under the topical heading of the several chapters and sections and accompanied with layouts or definite specifications complete the volume. The book should find quick acceptance not only in engineering and advanced technical schools, but also among advanced night schools.

Drawing from Memory and Mind Picturing.

By R. Catterson-Smith. Cloth, 89 pages, illustrated. Sir Isaac Pitman & Sons, New York, N. Y.

This is a most interesting work for the art teacher and covers a phase of art instruction that is rarely emphasized in American schools. In fact the secondary school which makes a consistent effort to strengthen the art memory is hardly to be found outside the large cities. The author discusses the general problem or as he phrases it "the goings on of the mind in relation to art" and then outlines the methods which he has successfully employed in his classes. In the Birmingham School of Art, in which he taught, the author used plants, live animals; measured drawings, colored lantern slides, etc., as means of memory drawing. Classes were taken to the art museum and on local excursions for observing art objects, plants, etc., to be used for subsequent drawings in the classroom. The applications were made not only to free-hand sketching in pencil and pen and ink, but also in modeling and designing as applied to art metal work, jewelry, etc. The book is well illustrated with drawings by students.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Refinishing Piano Bench.

253. Q:—Could you please inform me as what I should do with a mahogany veneered piano bench, which has been sat on, and the imprint of the cloth is left on the surface of the varnish? I have tried all sorts of polish, without effect as it seems below the surface.—W. M. D.

A:—I would suggest that you restore the finish on the mahogany piano bench by thoroughly rubbing the damaged portion with felt pad, F pumice stone flour and water, until all traces of cloth impressions are removed. Sponge off, wipe dry with a chamois and let stand five or six hours in a warm room before varnishing with a full bodied coat of Pratt & Lambert's floor varnish No. 61. This is hard and tough and is both heat, water and wear resistent. At the same time it carries enough gum to enable it to take a very good polish. The use of a "tacky cloth" made by wringing out any firm cotton cloth in varnish, just previous to the varnishing operation, will effectually remove the traces of pumice stone which would otherwise be left to mix with the varnish. This varnish should dry not less than a week or ten days before rubbing out and if a polished finish is desired, should stand another day before being rubbed with rotten stone, felt pad and water. This last should be cleaned off with a sponge and plenty of water and a good polish applied. The bench should not be used as a seat for at least a week after varnishing is complete, in order that it may have ample time to cure and harden.—**Ralph G. Waring.**

Finish for Poplar.

255. Q:—I have four poplar table legs that I prize very highly, due to the fact that they are hand made and by a very dear friend. How would you advise me to finish them, should I use them in a table?—R. D. W.

A:—The finish to be used for poplar table legs would depend entirely upon the fact as to whether they would be used for a table which was intended to match other furniture or whether new furniture would be built to correspond with the table. It is of course, only possible to suggest an answer in the latter case, since there is no information given as to the furniture with which it may be placed.

Poplar readily stains in various shades of tobacco brown, walnut, and mahogany and is often used to replace these woods in turned and shaped work for period designs. After the table is completely assembled, it should be sponged freely with clear warm water to raise any bruises to which poplar is very susceptible and should then be allowed to dry thoroughly, after which it should be sanded smooth, finishing with 00 paper. It should then be given a coat of suitable water stain and allowed to dry. Oil and pigment stain should be avoided on this wood as they invariably produce a muddy effect. When the stain is thoroughly dried, without sanding, give it a size coat of very thin shellac and let dry. Sand glass smooth with worn out 00 or preferably a split 0000 paper, dust off and brush on a good coat of varnish. When sufficiently dry, as in three or four days, sand smooth and free from nibs with a split 0000 paper and revarnish. Repeat to three or four coats, rubbing out the last two with FF pumice stone, felt pad and water. Wash off and clean up with a good polish.—**Ralph G. Waring.**

Building Plans.

263. Q:—Is there any firm that sells blue prints of small houses and bungalows?—M. A., Porto Rico.

A:—Complete working drawing for houses, flats, bungalows, garages, farm buildings, etc., can be purchased from a number of firms in the United States. Practically all of them are intended for the continental, rather than insular, part of the States and may not be of direct value to you.

The following building magazines issue a complete plan with specifications and bills of material each month.

"The Permanent Builder, " Chicago, Ill. (Usually brick, tile or concrete construction).

"The Building Age," published by the David Williams Co., New York City.

"The American Carpenter and Contractor," published by the Radford Architectural Co., Chicago.

"The Builders Journal," published by Rogers & Manson, Boston, Mass.

A supply of back issues of these magazines will make excellent material for class study in house planning, architectural drawing, carpentery, roof framing, etc.

A good deal of material is available from lumber and building material manufacturers associations and others. Practically all of these issue booklets in which small scale sketch plans are printed and sell full working drawings in blue print form. A few such sources of plans are:

"Brick for the Average Man's Home," (a book of plans), $1. Common Brick Manufacturers' Association, Schofield Building, Cleveland, O. Working drawings and specifications of houses, bungalows, etc., are sold at low price by the association.

"House Plans, Garages and Farm Buildings" (folder) gratis. The Hollow Building Tile Association, Conway Building, Chicago, Ill. The sketch plans in this folder are available in full size working plans at $2 for garage plans; $5 for farm buildings and $10 for residences.

"Face Brick Bungalows and Small House Plans," (4 booklets), $0.25 each; "The Home of Beauty," $0.50; "Manual of Face Brick Construction, (with 30 plans), $1. The small scale sketch plans in these pamphlets are available in the form of complete working drawings at $12 per set. The American Face Brick Association, 110 South Dearborn St., Chicago, Ill.

"Home Building Book," published by the North Carolina Pine Association, Chamber of Commerce Bldg., Norfolk, Va.

"Beautiful Homes and Plans Book," published by Stanton & Van Vliet, 501 Plymouth Court, Chicago, Ill. Price, leather $2, paper $1.

"Home-Kraft Homes," published by the De Luxe Building Co., 521 Union League Bldg., Los Angeles, Calif. Price, 2d edition, $0.50.

"Plan Kraft," published by the De Luxe Building Co., 521 Union League Bldg., Los Angeles. Price, 3d edition, $0.50.

"Modern Homes and Bungalows," H. M. Miller, Roanoke, Va. Price $1.50.

"Types of Modern Brick Houses, Standard Construction, Home Builders," published by the T. A. Randall & Co., 211 Hudson St., Indianapolis, Ind.

"Honor Bilt Modern Homes," published by Sears' Roebuck & Co., Arthington & Homan Aves., Chicago. Paper, gratis.

"Homes for Workmen," published by the Southern Pine Association, 600 Interstate Bk. Bldg., New Orleans, La. Price $5.

"New Colonials," published by E. W. Stillwell & Co., 325 California Bldg., Los Angeles, Calif. 55 plans, $3,000 to $20,000. Paper, $1.

"Representative California Home," published by E. W. Stillwell & Co., 325 California Bldg., Los Angeles. 50 plans, $3,750 to $12.000. Paper, $1.

"Architectural Monograph on a White Pine House for the Vacation Season," published by the White Pine Bureau, Merchants National Bank Bldg., St. Paul, Minn. Paper, gratis.

The following firms make a business of selling plans (blueprints): The Radford Architectural Co., 1827 Prairie Ave., Chicago, Ill. $5 to $50. per set. Max L. Keith, McKnight Bldg., Minneapolis, Minn.

Smith-Hughes Department. A Smith-Hughes department has been opened at Morenci, Ariz., in the copper mining district. The department is composed of one large forge room, one machine room, and one garage in which automobile mechanics is taught. The wood working department comprises two rooms, one for machinery and the other for bench and tool work. The home economics department is equipped both for vocational and domestic science courses.